MODERN PLASTICS

FEBRUARY 1935

LANSTON

SUBTRACTS PRODUCTION SAVINGS

ADDS SALES APPEAL

—and finds it pays to mold
the case of their new Barrett Figuring Machine of

DUREZ!

Costs less to make *because*

—it would require *nine* production operations to make the case of metal. And only two to mold it of Durez! Blanking, forming, trimming, grinding, sand blasting, phosphate finishing, scratch brushing, japanning and baking would be necessary with metal. Only two simple operations . . . molding and removing fins . . . are required with Durez! No costly delay for recutting to make the case fit the base is necessary . . . for the Durez cases are uniform; the first or the thousandth will be exactly alike. And there is no extra cost for applying the trade-mark, for it is done—permanently and attractively—in the single molding operation.

Easier to sell *because*

—the smooth, lustrous Durez finish is attractive and pl ant to the touch. And will *stay* that way! The hardest won't dull or chip it. The Durez case deadens the n of the mechanism, providing almost silent operation an important selling point where many people work one large office. With the Durez case, the calculato compact and light in weight, and can be carried f place to place for auditing work. For more complete formation concerning the application of Durez to y own product, write General Plastics, Inc., 352 W Road, North Tonawanda, N. Y.

THE NEW BARRETT FIGURING MACHINE

The new Barrett Figuring Machine satisfies a great demand in three distinct fields of figuring. The first is the large organization where it would be used primarily for verifying totals already secured in some other manner.

The second is those small concerns which have never felt that they had quite enough work to warrant the investment in a high-priced adding machine, but which have, nevertheless, always felt the need for one.

Third, the public accountant and the traveling auditor will like the Ba Figuring Machine. The weight and size, even after the machine is plac its attractive carrying case, permit it to be placed in a trave ing bag easily transported. The Barrett Figuring Machine does not equire p nor ribbons and the cost of operation is very low. A novice, w thout p ous experience or training, can operate it with great speed nd accu

You can do it better with DUREZ *The Modern Molding Comp und*

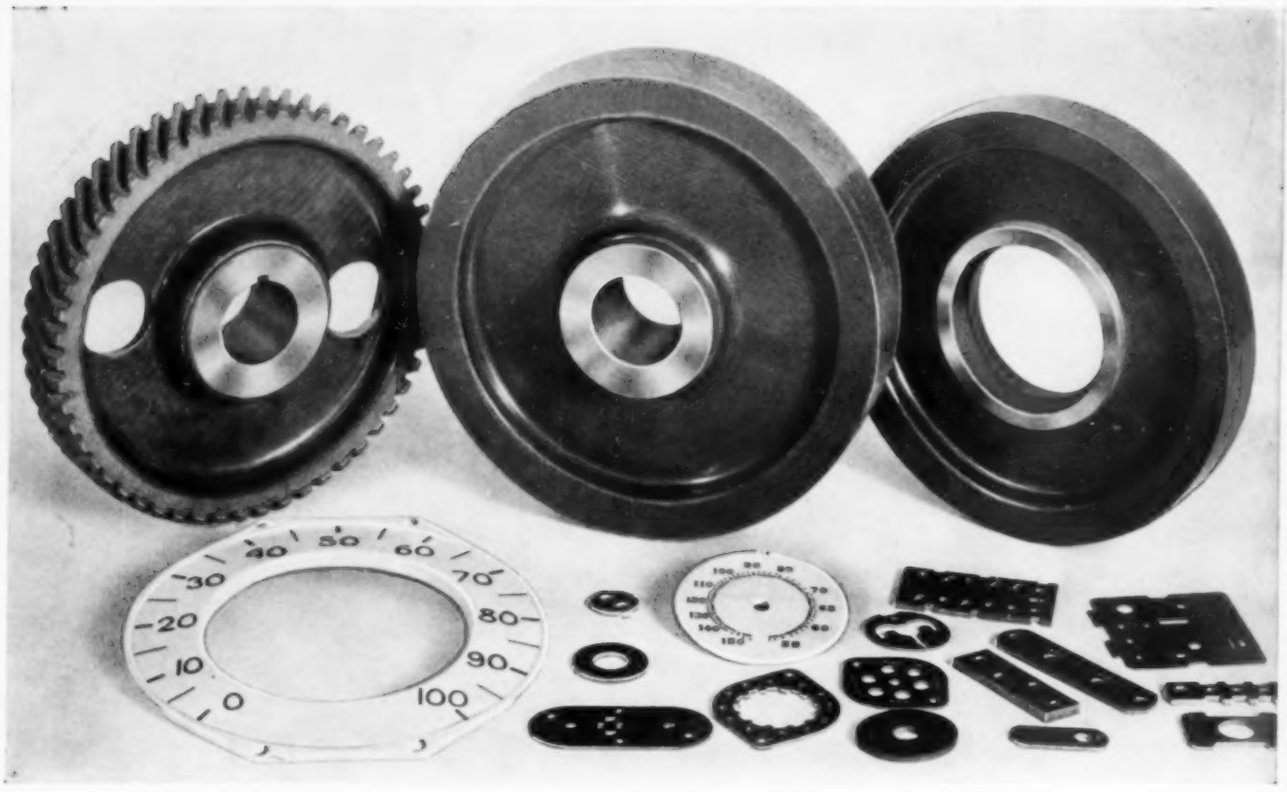
VOLUME TWELVE NUMBER SIX

FEBRUARY 1935

MODERN PLASTICS

WITH WHICH IS COMBINED PLASTIC PRODUCTS

Published the 5th of each month by Breskin & Charlton Publishing Corporation. Publication office at 20th & Northampton Sts. Easton, Pa. Advertising, editorial and general offices at 425 Fourth Ave., New York, N. Y. Telephone Ashland 4-0655. Western office, 221 N. La Salle St., Room 620, Chicago, Ill. Telephone Randolph 6336. Entered as second class matter September 21, 1934, at the Post Office at Easton, Pa., under the Act of March 3, 1879. Subscription $5.00 per year. Foreign and Canadian postage $1.00 a year extra. Price this issue, 50c per copy.



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MODERN PLASTICS

BRESKIN AND CHARLTON PUBLISHING CORP.
FEBRUARY, 1935 VOL. 12, NO. 6

THE ARCHITECT, THE THEATRE AND PLASTICS

by Wm. L. Pereira

PRIMITIVE man was probably not aware of the fact that his rude hut of stone or wood was limited in its size and shape by the character of the very substances of which it was built. Even today progress and changes in architecture are dictated by the materials available and the development of tools with which they may be fabricated.

Almost daily man is discovering new substances and developing products that will eventually find their proper niche in the galaxy of available materials. Unfortunately these products developed by scientists and engineers are at the mercy of persons of lesser knowledge, insofar as their use is concerned, who apply a time-worn measuring stick to their judgment.

Generally the building profession is tardy in the employment of new things and not uncommonly frowns on the use of excellent contemporary materials which it terms "substitutes."

All too frequently this failing of those who direct building is due to their inability to study the merits of new products or to recognize their responsibility as men of professional status employed for their knowledge and the inclination to investigate all that science has to offer as a foregone conclusion. Ignorance is disguised as conservatism.

It is the positive duty of an architect, in order to render the service that modern building necessitates, to fortify himself with the academic background, the physical equipment, and the willingness to study new materials of which the products of synthetic chemistry are not the least important.

Because of the extensive experience which William Pereira and his associates in the firm of Pereira, Senseney and Pereira have had in the use of laminated plastics in the remodeling of neighborhood motion picture houses, MODERN PLASTICS requested him to write of his experiences, from the viewpoint of the architect rather than that of the plastics industry. His criticisms will no doubt call forth heated answers. . . his praise of plastics may seem too limited to some. Yet it must be remembered that he speaks for himself, as an architect. MODERN PLASTICS would be glad to print any pertinent comment . . . pro or con . . . which this article may arouse.

Having the academic background and an enthusiastic willingness, we strategically located our office and equipped it with a compact experimental laboratory in which to study new products for our own edification and the ultimate benefits of our clients. We occupy the penthouse of "333," a thirty-five story building in Chicago. The building is flanked by Lake Michigan to the east and the Chicago River to the north. This affords us excellent facilities to subject materials to a running weather test under the severest conditions by placing them on the roof of the building. The laboratory, a photograph of which appears, is equipped with all the substances to be found which would tend to deface or destroy a building material, ovens for heat tests and wear-testing machinery. Often our experiments expose a possible new use of a material for purposes unknown and not previously considered by the manufacturer. Needless for me to say the results of our laboratory frequently dictate our design results; for today's architectural design or "modern" architectural design is simply the manifestation of materials in beautifully proportioned areas.

Our office carefully observed business conditions and trends early in the depression. We were confronted with its paralyzing effects, as was every other profession, until we realized that if we were to do business we had to create

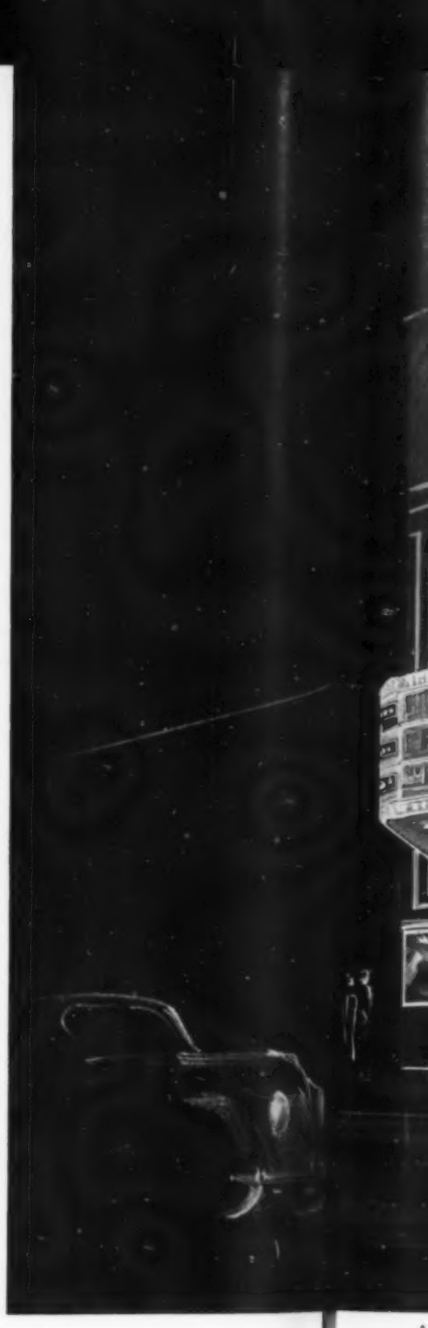
it. We were further stimulated by the definite ide that if the services of an architect are useful to business at all it is essential to demonstrate it during trying days rather than accept the fact that a period of waiting is inevitable until "conditions" improve. If the latter is true, then we who had developed a service and adopted a profession that we thought was an essential aid to business and a necessity to society can only conclude that architecture and its usefulness is a luxury to business. Obviously the answer is not the latter; on the contrary it is—alteration, rejuvenation and modernization.

We cast out eyes about for new materials, materials that would satisfy the needs, either temporarily or permanently, of our clients and their problems, and, more important, suit their sadly depleted purses. Among the industries we serviced was motion picture exhibiting with our premise that modernization could be economically, effectively and efficiently accomplished. Not modernization in the sense of a new coat of paint—the usual method, but complete transformation that would have a genuine effect on the theatre patrons.

The older motion picture houses we investigated were originally built for legitimate theatre use. Naturally they reflected the architecture of their day. They contained imitations of other materials executed in sheet metal, cast iron, plaster and terra cotta. The theatres built for motion picture use were more elaborate, carrying with them much of the same attitude in design, but because of the ready acceptance and appreciation of the public for pictures were more extravagantly constructed. The architects drew from palaces of the past until there was nothing more palatial to be done.

But the motion picture has come into its own. It has earned the right to its own quarters. It has outgrown the traditional architectural styles as such and the fetishes of the old legitimate theatre, as much as the automobile after a terrific struggle succeeded in ridding itself of the external appearance of a horse-drawn carriage. The motion picture is a successful modern device requiring its own architectural expression in design and materials. Building new theatres at this time was economically impossible. The alternative was obviously modernization with the application of those thoughts. We realized that the older houses needed attention immediately, knowing that in order to bring about complete transformations we had to familiarize ourselves with inexpensive products suitable for alteration work.

One of the first materials to fit into our ideas were the laminated plastics. Experiences with it as an interior finish, experiment in our laboratory, plus the cooperation of the Formica Insulation Company's organization led to its use in a number of theatres we have remodeled. It answered our need for an inexpensive surface available in various thicknesses, easily installed,



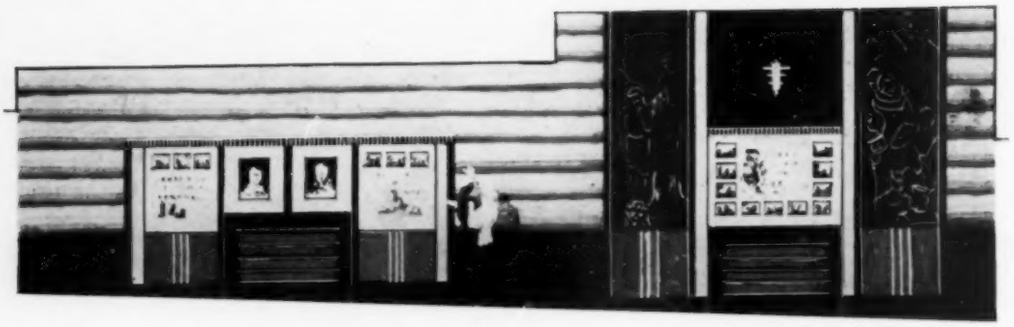
Before and after at Chicago's Covent Theatre. Note the transformation effected by the change of marquis and the introduction of a plastic panelled lobby. Such change-overs are particularly inexpensive when laminated plastics are used—yet the effect is one of high good-taste rather than of substitution

A more ambiticus remodeling job—in which laminated plastics are projected as a fiitting background for the neon tubing which provides the eye-effect at night

The Dearborn Theatre has been re-done in laminated plastics by Pereira, Senseney and Pereira—metal rules being used to lend a modern note in keeping with the neon flasher lines of the marquis. See also the photograph of the interior of this theatre on page thirteen

which would not be chemically active when exposed to the air. We found that it did not corrode or break down in use, and that a variety of colors were available which were remarkably stable in sunlight. Further, we found that it did not soften with heat, nor did any of the strong solvents generally used in cleaning injure the resin. These merits, plus the additional fact that the material installed cost about half that of more commonly used materials, furnished sufficient reason for our specifying laminated plastics on many of our projects. The question of permanence as compared to other products has been frequently discussed. Where it has been ideally installed on exteriors, three years have not marred the appearance of the material. However, if it is not permanent its initial cost does not prohibit replacement every four years, and the advantages of refinishing stock are many. We are inclined to favor its use whenever possible.

With the necessity for periodical rejuvenation to reawaken interest on the part of patrons in the smaller



A study of the re-designed lobby of the Pantheon Theatre, Chicago. Here a continuity of line is achieved by horizontal stripes of varicolored shades of laminated material

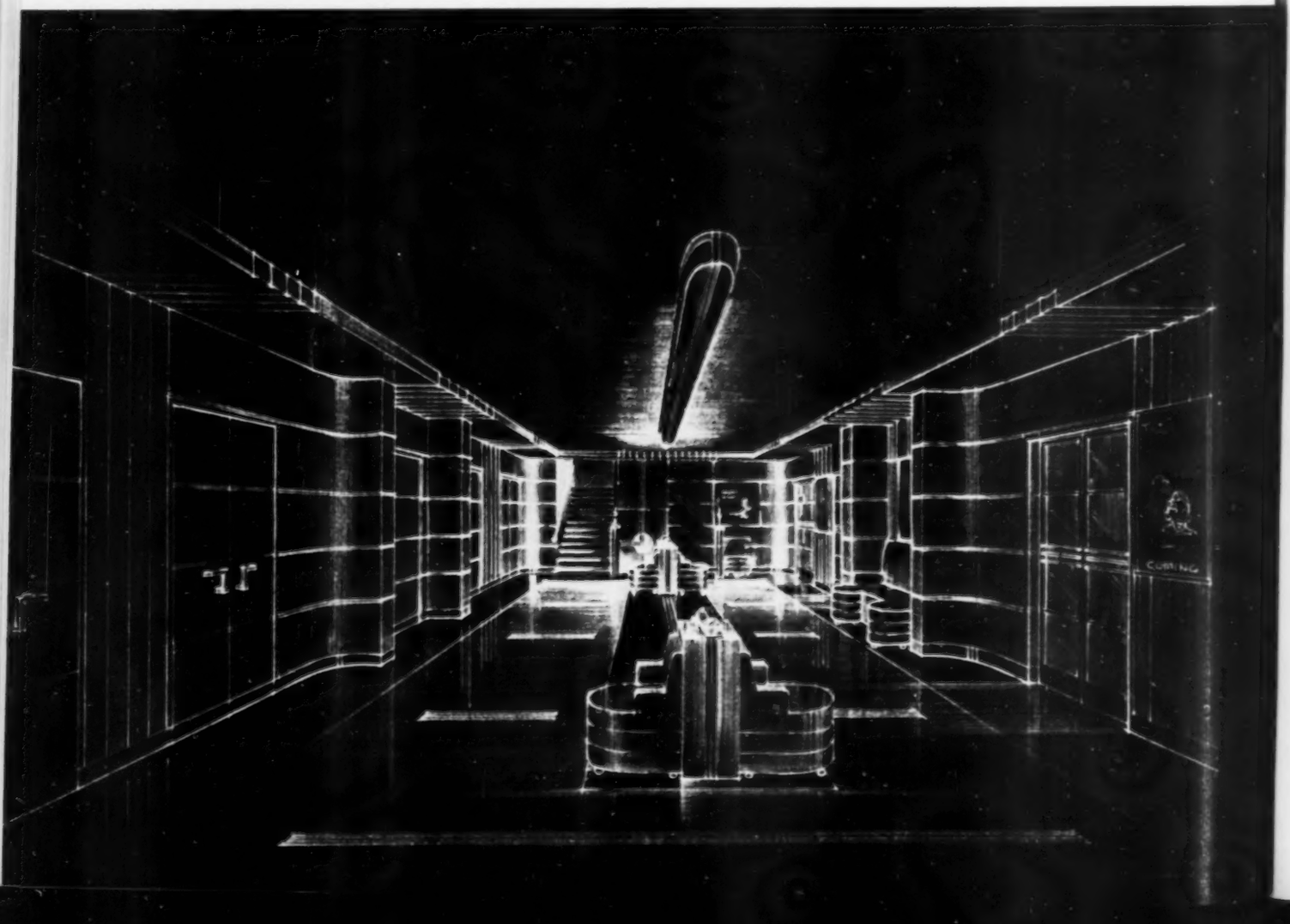
theatres presenting a constant problem, the low cost of plastics as a finished building material makes possible a complete change in appearance that no other available material at the present time can provide.

Recent development in the process of inlaying various colors as well as various metals in the sheet material has led to striking decorative results. We have used inlay with satisfying effectiveness.

As an interior material for wainscoting and veneering doors we have found the plastic a splendid product, easily cleaned and capable of withstanding the constant wear that both patrons and maintenance cause.

Briefly stated, we have found that the laminated plastics has a place in our list of building materials when it is necessary to specify a comparatively low cost material to finish the exterior of a modern alteration job; but in its present form it can only be considered a "substitute" material admirably suited to the requirements of "depression" building. The same project conceived and executed under normal or prosperous conditions might resort to marble, granite, glass or some such other material. I do not infer that the laminated plastic is not a good material; it is not as good a material as others for which we have substituted the plastic.

Projection of a lobby. Note the use of metal flutings (which cover the joints between panels) as an integral part of the design



A view of the Pereira, Senseney and Pereira laboratory on top of 333 Michigan Avenue, a thirty-three story building affording a perfect testing depot from a weather standpoint

Significance can be attached to the photographs shown of some of the theatres we have remodeled where laminated plastics were used on the exterior. They are all of the "neighborhood" type, remodeled with extremely low budgets.

The laminated plastic has not been used or considered by us for "de luxe" type theatre remodeling. Reasons which we can give are not necessarily correct, and as a matter of fact our reasons may only be opinions. Advisedly stated, the plastic lacks character as a building material. By character is meant the appearance of quality, depth and individuality. Disregarding practical merits and considering it purely from a design point of view, plain colored sheets of plastics are not more interesting than lacquered surfaces. Marble imitations lack the texture, quality and beauty of genuine marble and cannot be installed in the same manner as marble. Wood imitations are excellent under certain conditions, but their chief value is within the commercial furniture trade and not the modern building industry, where design success is synonymous with honesty in the use of materials and the expression of the structural framing in both exterior and interior. And so on through all the simulations of other materials.

Almost any terra cotta building illustrates the horror of convention and the unwillingness of men who build to advance. Consider the history of the design of a cornice on a terra cotta faced "classic" building. The Greeks first built of wood with posts, rafters and beams. The beam ends were decorated and held in place with wooden pegs. Later these same beam ends and pegs were copied in stone and today we find them identical in shape, but cast in terra cotta. This is an indictment of the building profession. From wood to stone to terra cotta, three totally different substances in the same design.

The first railroad coach was built of wood. Not until very recently did the coach builders cease to simulate (in but a few cases) wood graining on any and every material possible in the interior of the modern coach. Now, we have up for the building industry's consideration the case of the laminated plastic—a product that has been supplied to us by engineers and scientists.

Tragically enough we are already started on the path of imitation. We have been told that the law of supply and demand is the controlling factor. That is the path of least resistance. The demand *can* be educated!

The future of the laminated plastic or the solid plastic in building lies not in its ability to imitate, but on the contrary it lies in its ability to take form as a material or as materials that will be distinctly individual, with texture and richness peculiar to the plastic itself—in other words, an intrinsic beauty that will call it into use for its own sake.

Interior scene in the Dearborn Theatre. Note the use of light colored plastics and the effect of spaciousness achieved by the horizontal striping

The beautiful terra-cotta color of carnelian has been achieved in this smart Catalin necklace, bracelet and ring worn with a plaid dress from B. Altman and Co. This and other photos shown through the courtesy of the American Catalin Corp.

CAST PHENOLICS FOR COLORFUL

THERE are at least three basic reasons why manufacturers of costume jewelry are looking forward to a prosperous 1935 season.

The first is the vogue for more numerous and varied accessories to a costume. The slogan "assemble your own accessories" featured by McCreery's, and underlying the accessory promotion of many other New York stores, summarizes the trend of the modern woman's purchases. She is very apt to purchase a dress of dark or neutral ground and provide variety for her costume by changing whole sets of accessories—hat, bag, gloves, earrings, ring, necklace, clips, bracelet and belt buckle—using all or a few of these to create a desired effect. Naturally, this provides a great field for the creative designer of costume jewelry. He provides sets in every color and material combination from which a customer may make her selection. A set like "Regatta" brings to the customer wishing a gay white, red and blue decoration, a wide choice. A customer may choose from pins shaped like Neptune's trident, a small yacht, an oar in white cast phenolic material with its handle wrapped with blue waxed string, a pilot wheel, a life saver in white casting with bands of red. In this same set are provided three styles of clips, a pair of small and two styles of large clips. Also two types of belt buckles, a bracelet and a necklace.

Other manufacturers have followed the same idea in almost every line. A complete assortment with several designs of each piece of jewelry is available. This immediately not only provides material for counter display but also copy for promotional advertising since each set may be made the theme of one advertisement or a whole promotion. The tendency to name these sets with fanciful and colorful titles has also helped in promotions and has no doubt contributed to moving larger quantities of merchandise.

The second reason why manufacturers of cast-phenolic costume jewelry are looking forward to a heavy spring and summer season is the marvelous adaptability of these castings in combinations with other material—wood, metal, rhinestones and ivory—in popular priced ranges. Phenolic jewelry can be purchased in retail stores of good standing, from fifty cents to three dollars, the best, of course, being between

This necklace of cast phenolic material, with bracelets to match, contrasts effectively with a plain color dress. Although the trend toward high necklines has reduced the market for necklaces, merchandise of this combination-set type finds many purchasers

AID THE VOGUE COSTUME JEWELRY

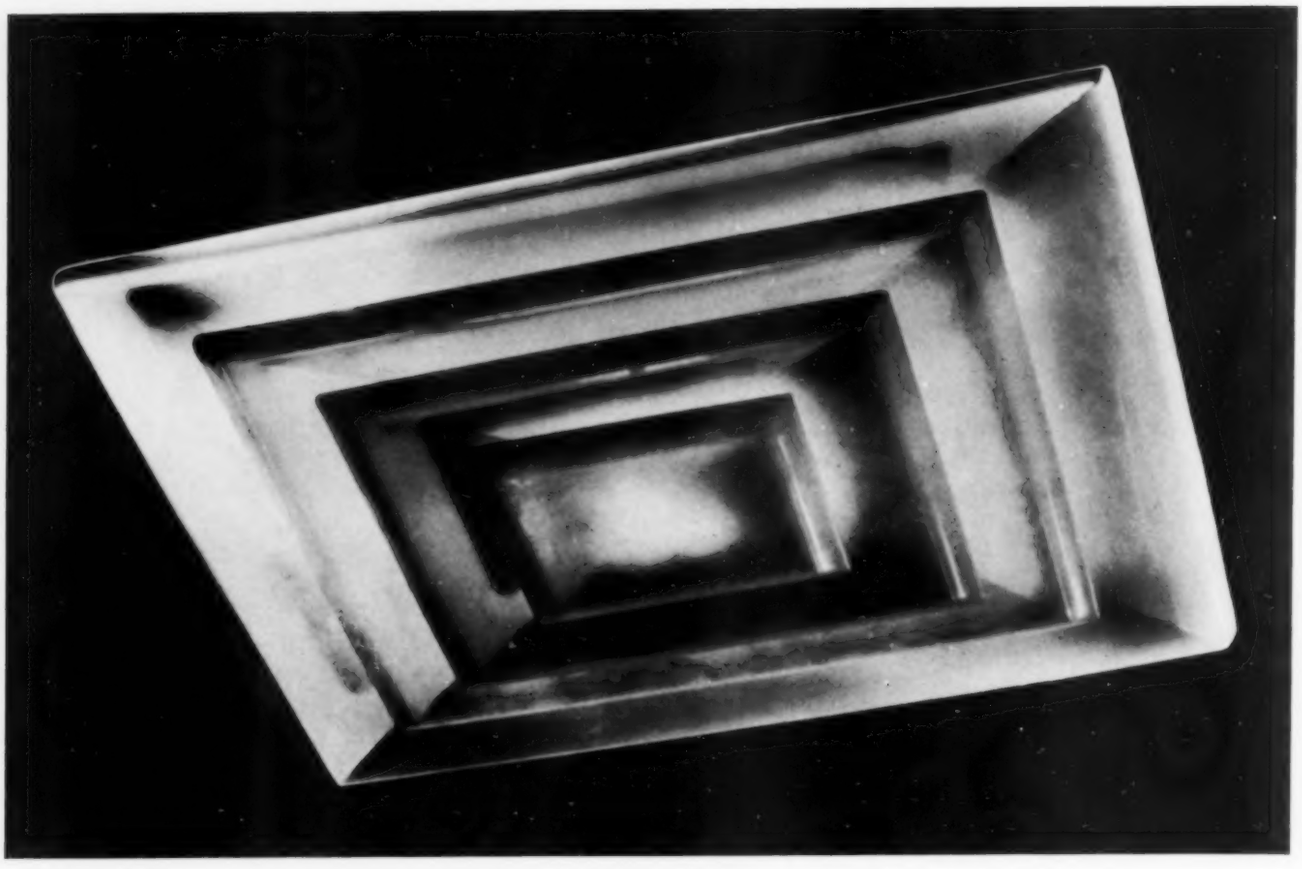
$1.00 and $3.00. With such a moderate price prevailing, the customer is able to buy not one, but several sets or single items in colors to harmonize with her various costumes for daytime and also for evening.

A third reason is the great emphasis on color this season. 1935 spring fashion predictions have pointed so gaily to many-color fashions that jewelry is following the same bright trend. This year, as never before, clothes are being shown for cruise and sportswear which are made in three color combinations, yellow trimmed with bands of terra cotta and chartreuse, blue with peach and rust, black with white and any one of a number of other colors, and finally a wide range of gay and lavish tropical colors such as turquoise called Bahama aqua, a deep lemon yellow known as Panama yellow, a scarlet known as Jamaica red and so on.

Spring prints with dark grounds and bright small patterns call for bright colored clips, bracelets, buckles, earrings, and pins to accent the color. Already spring fashions bring in plain pastels inspired by the regency fashions which were greatly heightened by the popularity of Noel Coward's "Conversation Piece," an international success with its action placed in the period of the Regency rakes. These Regency colors—dusty pink, mauve, light green, chartreuse, blue and white, call for their own large group of accompanying jewelry—jewelry which may, in its decoration or carving, embody the feather motif to be worn with the small regency hats, or the flower motif to accompany the flowers, corsages and buttonnieres worn with the demure long gowns.

The cast-phenols being the materials most adaptable to use in innumerable color combinations, are again assuming an important place in the jewelry offerings of New York department stores. The ground they gained last summer, they will more than hold this year. The deeply carved bracelets, clips, earrings, pins, rings and belt buckles, which won such wide acceptance this winter in dark brown, carnelian, green and other colors to harmonize with brown or black, are continuing through the spring.

In addition to this carved range there is an amazing variety of jewelry available in the plain varieties—"plain" being uncarved but (*Continued on page 51*)



BLAZING NEW TRAILS

by Morton Staples

WALK into the elevators of Radio City and you will note a pleasant, soft light pervading the compartment. Look upward and you will find the entire ceiling a glowing series of concentric glowing rectangles of what may or may not be a strange material to you.

The material is a cast phenolic . . . the manufacturer of the fixture the Apex Specialties Corp. . . . the creator, the reluctant creator, Frank E. Wocel. For Mr. Wocel frankly discouraged the use of plastics when the project was first discussed. At the time, cast phenolics were so new . . . particularly to applications such as these, that he felt it impossible to guarantee the success of the material. When asked to bid on this job—a request that would have delighted most manufacturers—he made his bids reluctantly and with reservation.

When weeks passed and he heard nothing further of the project, he breathed easily and dismissed the matter from his mind. Yet a year later, he was called in to make a model which was promptly approved. Sixty-two fixtures were ordered, each twenty-two by twenty-six inches and fabricated from phenolic castings, mitred and screwed to a metal spider. As originally planned these fixtures were to have been made of glass, but their massive size and construction with thin louvers represented considerable weight, and while danger from breaking and falling was remote, it was nevertheless present in high speed cars. Plastics therefore came in for consideration. The total weight of each fixture was reduced, thereby, to about thirty-five pounds—one-fourth its weight had glass been used as planned. When the additional advantage of more pleasant lighting qualities was considered, cast phenolics became the logical choice.

I asked Mr. Wocel if the morbidly subdued light in these elevators was the result of using plastics.

"No," he replied, "the soft lighting effect was designed by the lighting engineers to give a feeling of repose and quiet travel to passengers who hardly realize they are moving at express-train speed in this atmosphere."

He has made other lighting fixtures to architects' specifications for use in private apartments where individual treatment finds ready expression in this versatile material.

Mr. Wocel's ideas about plastics in building trades are not in the least prosaic. They are fresh and interesting in their application. He showed me a model of a decorative column he has made for theater fronts which may be as candy-striped as the gayest barber-pole, or as quite and esthetic (*Continued on page 58*)

Photo above: courtesy Marblette Corporation

TRANSFER MOLDING BROADENS FIELD

by E. L. Fredricks

THE remarkable strides made during the past few years to further the use of plastic materials in all lines of industry have caused molders to put their imaginations at work to improve their technique and overcome difficulties encountered in molding unorthodox shapes, and those with metal inserts which are easily damaged by the conventional procedure.

For those who have never seen plastics molded, I will attempt to illustrate the process in a most untechnical manner. To begin with, plastics are not delivered to the molders, as some believe, in liquid form ready to be poured into molds to "set." Most plastics are hard dry powders delivered in bulk, then usually measured automatically and compressed into "preforms," which may, or may not, bear any relationship to the final shape of the object to be cast.

HENRY M. SHAW

President of the Shaw Insulator Company
Irvington, New Jersey

A pioneer in the field of plastics since 1892 when he began molding electrical insulation and objects from all types of plastic materials. Frank H. Shaw, his son, joined him in 1912 and since then has contributed much to research and the development of molding technique

The mold, which gives the object its shape, is of hardened steel, cut and polished with infinite care and frequently chromium plated to give smoothness of finish to the molded piece. It represents a major item of expense and is correspondingly important, because no molded piece can be better than the mold in which it is made.

Molds are made singly or in gangs depending upon the number of pieces to be made with one operation. Preforms are placed in each mold cavity and the top force plate of the mold set in place. Then the mold is put under a hot press which shapes the object by plasticizing the molding material and forcing it rapidly into every portion of the mold. The heat and pressure required for this operation would excite the envy of old Satan himself. Of course, it is difficult to gage the size of preforms to contain the exact amount of powder to fill the mold and any excess must escape somewhere under the impact of the press. Consequently it squeezes out at the mold separations and adheres to the castings as finns which must be removed and their evidence polished away.

Industrial molding, however, is not that simple. The mere fabricating of plastics is but the beginning of some of the difficulties which have beset molders since these materials have gained recognition and acceptance by nearly all major industries throughout the length and breadth of this country and abroad. Manufacturers demand metal inserts cast into the plastic forms with micromatic precision. In many instances, metal bearings or threaded pins must be molded in place with not .001 in. variance. Channeled forms with definite control of wall thickness must be cast. The closing of the press often threw metal inserts askew. Bearings and pins were frequently collapsed during the molding operation. Definite control of wall thickness was next to impossible. Waste, which was a considerable item, had to be reckoned into the cost. To overcome these difficulties, the Shaw Insulator Company of Irvington, N. J., has made rather rapid progress in extruding plastics, or in transfer molding as the company terms it.

The principal difference between transfer molding and conventional molding is in the nature of the mold itself. It has a separate heating chamber for plasticizing the thermo-setting material, and is connected with the mold proper only by tiny openings, or gates, through which the plasticized substance flows until the mold is completely filled. Transfer molding, compared to the conventional method, is gentle in action. The plasticized material flows into the tightly closed mold without shock and eliminates the danger of collapsing delicate parts or disturbing their position, yet holds them firmly in place as the casting cools and becomes hard. Definite control of wall thickness is made possible in every casting.

Practically no finns appear on objects cast by transfer molding. The gates are too small to allow more of the plasticized materials to pass than is required to fill the

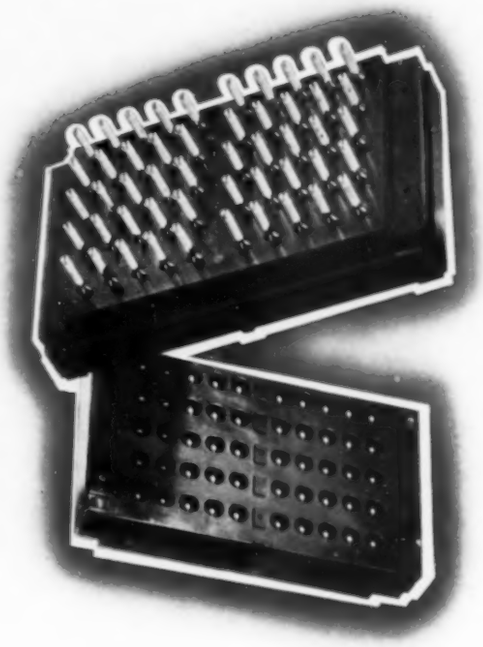
mold. The cull, or overcharge, remains in the heating chamber and finishing is reduced to a minimum. A tiny burr at each gate is quickly removed with a sand wheel and all evidence vanishes in polishing. Abrasive action on the mold is considerably lessened, assuring greater accuracy of castings from the same set of molds over a period of time.

Henry M. Shaw, president of Shaw Insulator Company, is an old timer in the business, beginning in 1892 to mold electrical insulation. He has molded every type of object that has been produced and used all kinds of plastic material. Phenolics, he says, were the first satisfactory thermo-setting compounds to appear, and their introduction really marked a new era in plastic molding.

Before phenolics, many compounds were grouped under the general heading of thermo-plastics and were molded for a great variety of purposes. That was in the days when every third telephone transmitter had a saw tooth edge due to chipping. Thermo-settings by no means replaced thermo-plastics, but they opened up a new school of thought and started the first real development in molding technique.

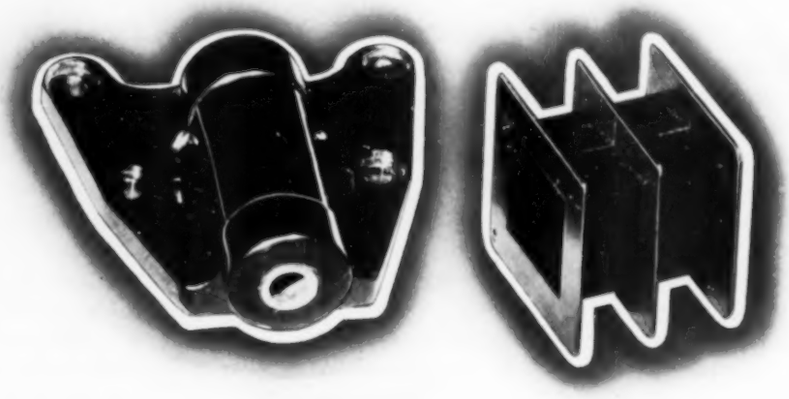
In 1912, Mr. Shaw recognized the possibilities of this new material and began to devote his whole attention to its fabrication. New molds had to be developed to accommodate these harder thermo-setting compounds and costs increased. Increasing demand for uncommon shapes forced costs to mount further until, finally, the idea was conceived to attempt to transfer the hard dry powders into plastic, or semi-plastic, state for extrusion. With the successful working out of the process came new possibilities of molding intricate parts which previously had been shunned because of limitations and difficulties imposed by orthodox methods. Delicate inserts became possible with no danger of collapsing, and wall thickness control became definite for the first time.

This technique has been refined to permit casting one-piece plastic bottles of any shape. They may be lined with certain specified metal if required. A glass bottle of any shape may be put into a mold and given a plastic covering of the same contour. It doesn't require much imagination to see what this advancement means to the future of industrial molding. Nothing is impossible. The field is wide open to make use of plastics in ways never before dreamed of. Manufacturers seeking unique containers will be quick to take advantage. Those with special manufacturing problems may be benefited through plastics which are made available for uses entirely new.

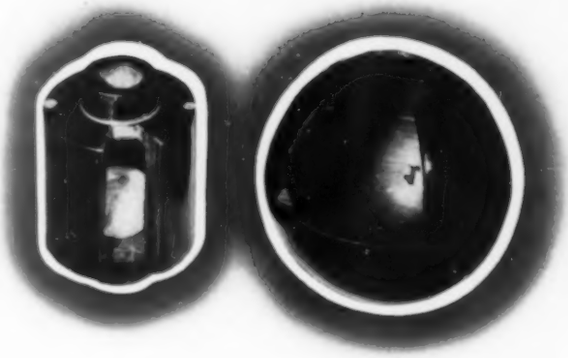


Western Union turret panel with 50 phosphor bronze inserts molded in place with no greater variance in height than 0.001 in.

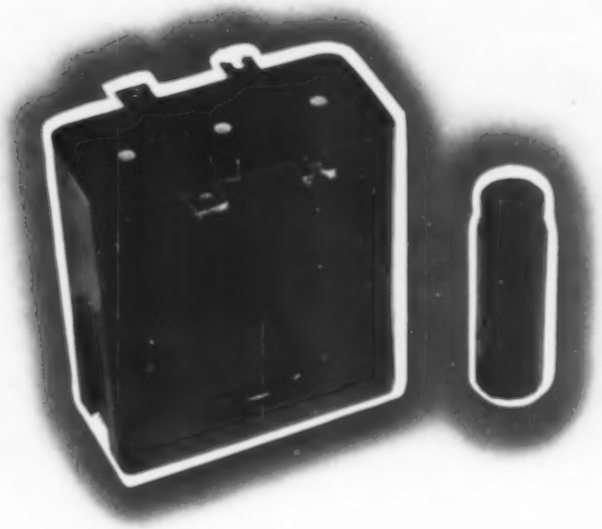
Some of the things already under way include plastic toilet-floats, which may be copper lined to last forever. Water cannot penetrate to the seams because the outer ball is cast in one piece instead of being cemented together. Thermos jugs, which are subjected to the action of moisture between the thermos-unit and the outer shell, may now be cast in one piece and copper lined for permanent service. Copper lined tubing can be extruded in required lengths, being impervious to moisture and insulated against heat or cold. Plastic valves may be cast with metal



Left: Schick razor bearing with hardened steel tube is molded by transfer without danger of collapsing. Right: Finns are negligible on this tiny coil form with paper-thin separators



Cross sections to illustrate new molding technique—Left: One piece tube with brass seat and glass marble enclosed. Right: Hollow sphere molded in one piece without cementing



Left: Coil box cover for telephone set showing tiny gates where plasticized material entered the transfer mold. Right: Electric razor handle of impregnated canvas and phenolics with but two tiny gates to remove in finishing

valve-seat and closing ball already in place. A model demonstrating this possibility is illustrated. Glass chemical daubers, which were formerly cemented into their handles, are now cast in one operation without danger of breaking the glass in casting, and without cement for acids or chemicals to eat away.

Electrical equipment combining plastics with fragile materials may be cast without injury. This was impossible to do by the old method. Short wave radio insulation requires the additional use of porcelain or glass for greater insulating quality than plastics alone possess. Either glass or porcelain inserts may be molded in place by the transfer method.

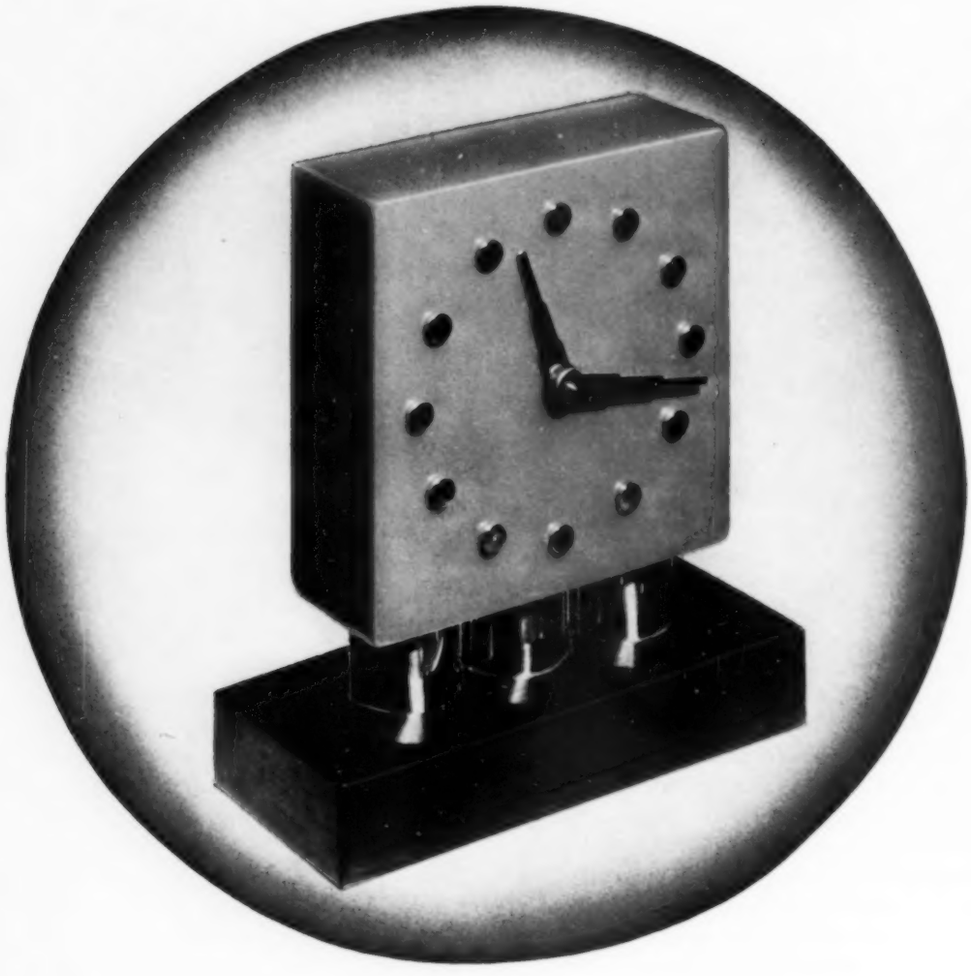
Canvas or other impact resisting material is frequently used as a strengthening agent. It is so thoroughly mixed with the material itself that it does not permit free removal of finns from the finished object and ragged edges naturally follow. Transfer molding permits canvas or impact materials to be molded free from troublesome finns without sacrifice in strength and with superior finish.

Pencil tubes, with spiral thread for metal arbor perfectly centered, are made by this transfer process with no variation of wall thickness and without finns. Points at the end of each tube indicate where the thermo-setting compound entered the tightly closed mold. Millions of these pencils have been made in the Shaw plant during the past few years with a negligible spoilage.

Lead filled shields for X-ray tubes are molded in one operation with threaded metal fitting properly and securely placed. They are uniform in size and no mold marks appear on the surface. (*Continued on page 57*)

Buss bars, of impregnated canvas and phenolics, come from the transfer molds with no ragged finns to remove. Finishing cost is reduced to a minimum. Below: Nose section of respirator with tapering channel and controlled wall thickness made possible through transfer molding. Also lead-filled x-ray-tube shield with threaded metal fitting an integral part

CAST PHENOLICS AND THE DESIGNER



BOTH cast phenolics and the molded plastics have distinct fields in which one is definitely more desirable for use than the other. Thus no one would propose to mold an object of which but a limited number were to be made, for the amortization of the mold costs would bring the final unit cost completely out of line. Likewise, no one would propose the utilization of cast phenolics for objects so complex in shape as to make their withdrawal from the casting mold impossible. Such objects, if made of cast phenolics, would require so much machining as to make their cost prohibitive.

There are, however, many instances in which both types of plastic seem equally suitable. In such cases, the designer must carefully consider every factor entering into final appearance and final cost before placing his decision one way or another.

Consider one typical case history—that of the clock shown in the accompanying illustration and designed and manufactured by Edwin A. Neugass. In this instance the weight of the majority of considerations led to the selection of cast phenolics, though many other instances might be selected in which the final choice was either phenolic or urea molding. The case chosen, however, serves to illustrate the nature of the necessary analysis upon which the final choice of method of construction must be based.

The clock is designed along modern lines, consisting of a solid rectangular base and a solid square case, separated from the base by three short brass or chromium rods. The front of the case is utilized as the face, small circular brass discs being used instead of hour numerals and sturdy brass hands being selected to carry out the motif of solidity.

The product was designed to retail at approximately fifteen dollars—a figure allowing the manufacturer a comparatively large amount for material and fabrication costs but, at the same time, placing a definite limitation upon the quantity which could be sold in a reasonable period of time. This quantity limitation, of itself, indicated the advisability of utilizing cast phenolics in this instance.

Construction considerations likewise made the choice of cast phenolics more likely. It was desired, for purposes of stability, that the base be reasonably heavy, so that while a decided material saving might have been effected by molding the base with a large hollow in its under side, this consideration was overbalanced by the desire for weight and solidity. (*Continued on page 42*)

EVOLUTION OF AN INDUSTRIAL PRODUCT DESIGN

by Don Mason
BAKELITE CORPORATION

THE Company: I-T-E Circuit Breaker Co., Philadelphia, Pennsylvania.

The Product: The I-T-E Circuit Breaker Co. has made large industrial circuit breakers since 1888. Last year W. M. Scott, President, decided that this same unit, redesigned, could be adapted to the lighter types of circuits, such as lighting systems for buildings, or the less heavily loaded manufacturing circuits.

The thermal circuit breaker is an electrical switch that snaps off automatically when the electric load is more than the equipment can carry. In industry this unit has to a large extent replaced the "blow out" fuse systems. When there is an overload in current, this new type of circuit breaker will not stay on until the overload has been relieved.

Figure 1—The first model roughed out in clay

Designer: Harrie A. Bell, President, Holmes Press.

Evolution of Design: The first model of the new Itelite thermo circuit breaker, designed by Mr. Bell, is illustrated in Fig. 1. This model was made of clay.

Later, a second model, shown in Fig. 2, was carved from a cake of ivory soap and contained several improvements over the original design. This second model was then painted.

At this stage, engineers and sales executives were consulted to check carefully every detail of the design.

Then a model was molded in beeswax, with the design further improved to include practically all of the final elements. From this model the dies were worked up and the first Phenolic molded Itelite circuit breaker was made. This unit is shown in Fig. 3.

Fig. 4 shows a single unit with the electrical mechanism enclosed. It will be noted that the white "slide" has given way to black, because it was determined that the only spots of visual importance to the switch are the "off" and "on." The latter were left white to catch the eye immediately. As a check on this quick visualization, there was added the customary heavy white line, which, when showing, indicates that the power is on.

Figure 2—Second model carved in ivory soap—then painted to study effect

Figure 3—The bakelite top without mechanism

The handle was made to conform to the straight lines of the design, and the corners were cut to form an octagon. The chief objective in the design of this new industrial product was to create a design that would portray the use of the product.

The finish of the Phenolic molded surfaces was carefully planned to catch and reflect the light only on that octagonal section in which the handle operates. Other surfaces were subdued by "groovings." All of these details can be plainly seen in Fig. 5, which shows the switch board unit complete.

Figure 4—A single unit ready for installation

These decorative groovings were not merely gouged out. Very careful thought was given to the actual form of these fillets . . . when they should begin and end, how close together they should be, whether they should lose their endings in the screw holes, or come up far enough to have a circular plain surface around the screw hole. Every detail had to correlate with the mechanical specifications of (*Continued on page 42*)

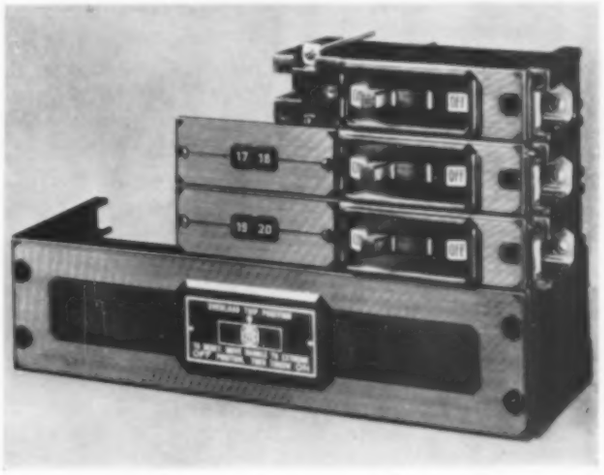
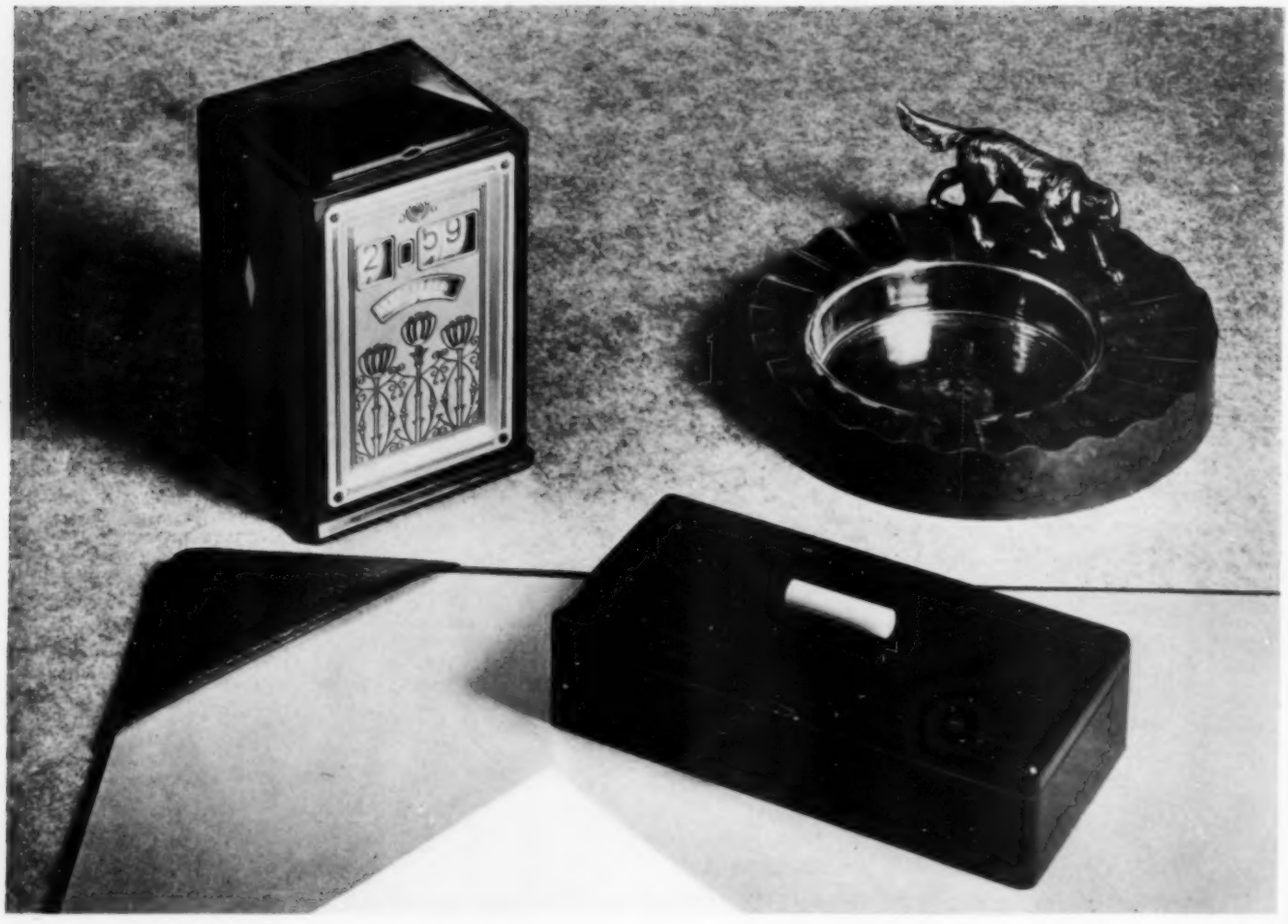


Figure 5—The panel build-up



"G. E." USES PLASTIC PRODUCTS TO IMPROVE DESIGN AND CREATE DISTINCTIVENESS

THE General Electric Company might be likened to a large medical clinic. The clinic provides treatment in the diverse fields of the medical profession. General Electric in a somewhat similar fashion provides "medicine"—in the form of its products—to meet the needs of many of the most diverse fields of industry. Horizontally, for example, G. E. serves such widely varied fields as the oil and printing industries; it makes numerous household appliances and thousands of industrial devices—usually electrical but by no means exclusively so. Most important, for the readers of this publication, is the fact that G. E. is not only a horizontal but also a vertical organization—one which makes at least a few of the many materials it fabricates into finished products.

In advertising, General Electric praises the use of plastic products and points out the advantages gained by using them. In manufacturing, G. E. uses molded parts in every sort of electrical device for insulation, mechanical strength, decorativeness, or for resistance to high heat, arcing or atmospheric changes. Also, G. E. uses plastics for many items which are not electrical.

Consider a few—as merchandise, as design, and molding engineering.

The electric clock shown in the above illustration has a molded casing which is available in a number of finishes, including dark brown and black. As a key to its design, the clock utilizes the modern drum-indicating dials in place of the conventional face and hands arrangement.

To accompany such clocks on the executive's desk or in the home, G. E. molds commodious ashtrays in which grooves, big enough to hold a fat cigar, center around an off-center glass receiving dish. To complete the ensemble, one finds a molded G. E. cigarette box such as the one above—which is black and rectangular in shape with a red cast-phenolic bar as decoration and

handle combined. From the designer's viewpoint all three of these items express dignity and maintain a simplicity of design that insures their blending well into any surroundings.

A totally different casing is the casing for the twelve-hour bell-alarm clock which G. E. calls "The Morning Star." This molded casing is available in a robin's-egg blue, ivory or black finish with gold trimmings, or a French-gray finish with chrome trimmings. Although it is intended particularly to harmonize with the boudoir, this clock's design and color combinations, made possible by molding, present a pleasing appearance in any room in the home.

In another field General Electric has come forth with a small molded filing cabinet. This 3 × 5 inch card-index box is of practical design, attractive in appearance, lasting in quality, and exceptionally convenient. It has found wide acceptance for record keeping in such diverse utilizations as those of the home, the hospital, the doctor's or dentist's office, the executive's personal file, the switchboard 'phone index, etc. This box is made of Textolite and has a sturdy piano-type hinge. It retails at one dollar, well within the price range of comparable boxes made of less convenient woods and metals.

In the display fixture field G. E. has developed a line of molded easels for holding card signs or small articles of merchandise such as handbags, silverware, shoes, china, jewelry, etc. Three of these easels are illustrated below. Of particular interest is one curved easel (at right of illustration) designed for handbag display when in one position and for a shoe display when turned over so that the straight projecting arm acts as a holder for the heel of the shoe. From a merchandising standpoint molded easels offer decided advantages of finish and appearance.

THE SAMPLING PRINCIPLE:

1. Applied to Lipsticks and Rouge

by Ruth Lampland

FROM free sampler to the Gift Set cosmetic sampler retailing at a dollar is the tale of Christy Cosmetics, Inc. It was only a few years ago that Mr. Christy, a former chemist and then a cosmetic distributor, decided that because of the many reasons for consumer dissatisfaction with existing cosmetic lines, he would manufacture his own.

The basis of his idea was sampling, applied to cosmetics, specifically lipsticks and rouge. He had found that women's first complaint about both was that they could find no one shade which seemed to suit all occasions, all lights, all colors of clothing. And they found few lipsticks and rouge colors which harmonized well with each other. There were minor complaints—that lipstick smelled "rancid" when it became old and its perfume had evaporated, that certain brands were too dry and others too greasy, and so on. But these he knew took longer experimentation, and although he has perfected a lipstick which is protecting to the lips and yet not greasy, he is still supervising researches which will further improve the product.

He began with the idea that a woman wished to see lipstick not in a round cylindrical form, but as it actually would look applied to her own lips. So he patented the "lip-shape" depression in a piece of metal or other material which could hold enough lipstick to simulate a pair of human lips—women's lips—almost perfectly.

His first "sampler," far from the present one, was distributed free at retail cosmetic counters. It showed five hues of red—from the orange to the bluer shades. It consisted of a paper folder, printed on four sides with information as to the matching of dress colors with cosmetic colors. The first page of the folder was cut out to form a window through which one could see the strip of samples of lipstick in the lipshape depressions on the card beneath. A protective piece of cellophane was inserted under the window to keep the lipstick in the depressions from being touched or smeared by the casual observer. There was a range of five shades. Later this range was increased to eight, to make possible complete harmony with costume colors.

The sampler was tied up with a Christy Cosmetics display in black with silver lettering—a wood base, backed with a round beveled mirror. The metal shade selector was inserted vertically in the base. The shades ranged from light to (*Continued on page 40*)

NEW IDEAS IN PLASTICS

SYNTHETIC plastics are now seeking to conquer a field quite different from that in which molded shapes are demanded; and any plastic material which can compete successfully with the older materials in this field will have a large potential market. Heat insulation is the new endeavor, and polystyrene is the preferred material, although the urea resins and the alkyd type resins are also considered suitable. By use of a blowing agent such as methyl chloride, and a suitable means for forming an impermeable skin over the cellular material, a product is obtained which gives excellent results in refrigerators and also retains its strength in vacuum bottles throughout the temperature range of use for cold or hot liquids. (Carl Georg Munters, French Patent 744,864.)

ARTIFICIAL dentures present many problems to the compounder of stable, durable plastic materials, chiefly because the human mouth is so sensitive. Tastes and odors in dentures are objectionable, and consumer demand is particular about color. The plastic material must be absolutely inert to the prolonged exposure to warmth and moisture in the mouth, and also to cleaners which may be applied to them. The plasticizers commonly used in cellulose esters are not sufficiently stable and free from odors and tastes; but it has been found that cellulose ethers can be successfully plasticized with chemically inert hydrocarbons or derivatives thereof to give very satisfactory dentures. Limonene, *p*-cymene, camphene, chlorinated diphenylenes and phenylethyl alcohol are among the suitable plasticizers. (Deutsche Celluloid-Fabrik, German Patent 591,282.)

ACRYLIC acid derivatives, such as acrylic nitrile, ethyl methacrylate or vinyl methacrylate, present such an excellent combination of optical and mechanical properties that they have a number of potentially important uses as substitutes for glass. Molded articles made by polymerizing these substances in the molds are highly transparent and can be worked on turning, grinding, planing and polishing machines. Window panes and transparent articles of tableware are among the potential products; but certain advantages over glass are most evident in the manufacture of lenses for optical instruments. Thus, compound lenses can be made in layers, one harder than the other, for special purposes. (Röhm und Haas Aktiengesellschaft, French Patent 772,932.)

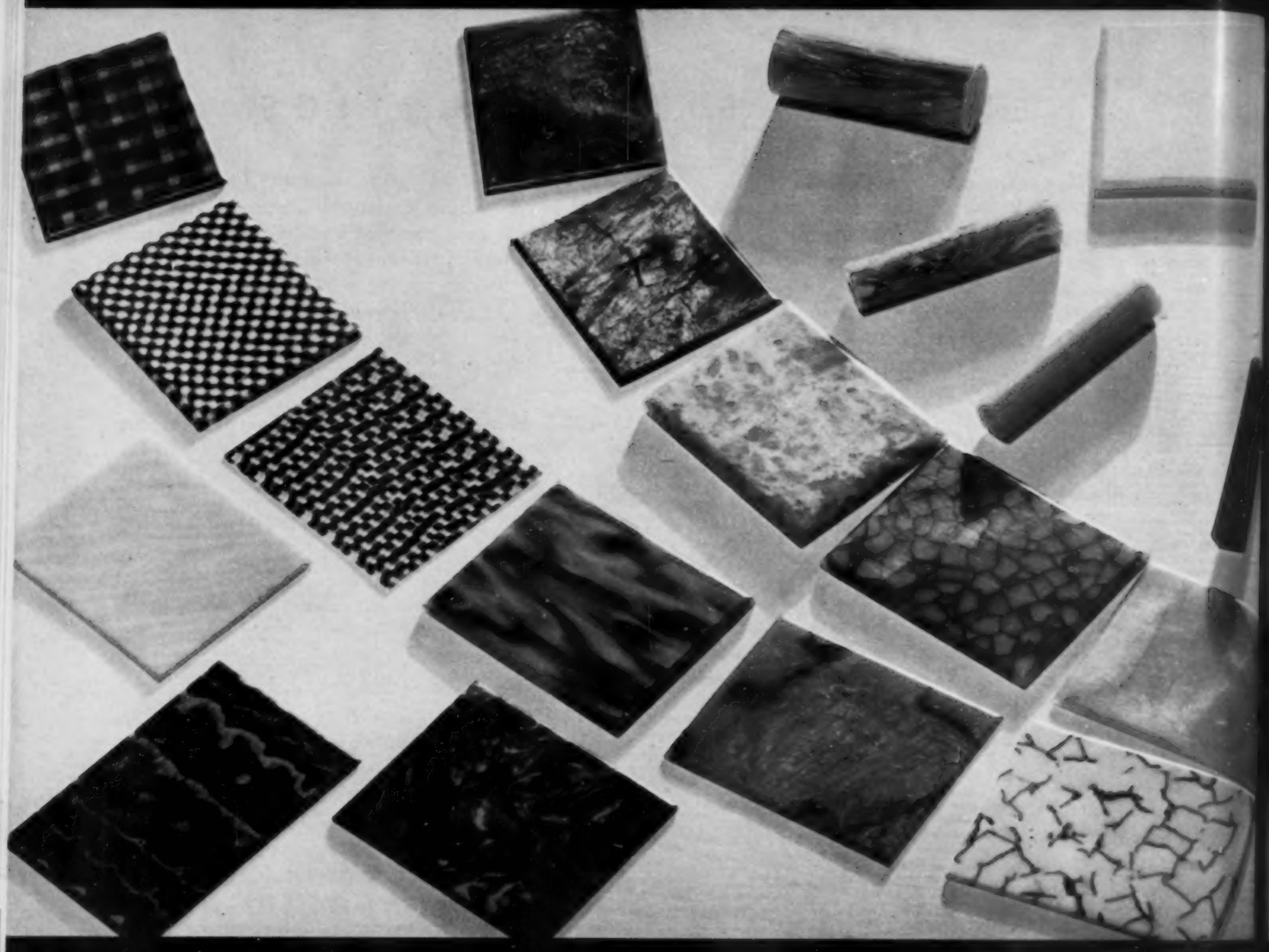
EXTREME surface smoothness, not hitherto attained in phonograph record blanks in preparing them for the sound track impression, is now obtained by accurately controlled cooling of the molten record composition. Bleached montan wax containing lead stearate is used, with a spiral cooling system which cools the molten wax from the center outwardly. The cooling is stopped at the temperature at which the cooling curve suddenly changes direction, and the temperature is held constant until a ripple traverses the entire surface of the wax. This leaves the surface remarkably smooth; cooling is then continued to room temperature, and the record blank is ready for the sound track impression. (E. M. Patterson, Electrical Research Products, Inc.; British Patent 415,797.)

SILENT gears of superior design and performance are now made by an economical method in which the center and the rim are formed separately and then integrally joined in the hot press molding operation. The rim is formed by polygonal folding of the synthetic resin and fiber composition along lines which are chords of the arcs of a circle; and this polygonal rim is fitted to a polygonal center to make the blank which forms the finished gear. (Wm. W. Carter, Formica Insulation Co.; U. S. Patent 1,984,113.)

THE rounded sides of molded tooth brush handles are formed by a simple and inexpensive mold arrangement which permits the use of blanks with square edges. This is done, according to a recent invention, by providing the mold with lateral hollows having the desired curvature, so that when pressure is applied to the top and bottom faces of the heated blank in the press the two side faces yield and fill the hollows, thus giving the molded handle the desired contour. (Frederic A. Parkhurst, Pro-Phy-Lac-Tic Brush Co.; U. S. Patent 1,984,805.)

MOLDED tiles for flooring have certain obvious advantages over ceramic tiles, and some advantages which are not so immediately apparent. A new composition has now been developed from which excellent floor tiling can be molded. Coumarone resin is blended with tung oil and then compounded with 65 to 80% of a filler in which asbestos fiber is an essential component, together with pigments selected according to the desired color effect. (Robert D. Bonney and James F. Maguire, Congoleum-Nairn, Inc.; U. S. Patent 1,985,201.)

MOLDED shells for flashlights have several advantages over the materials which have been commonly used for the purpose; and moldings of this kind are now successfully made from plastics of the vinyl resin type. A vinyl ester is polymerized together with vinyl chloride or styrene to a plastic having the desired properties; a hollow blank of this material is placed in a matrix and subjected, while hot, to fluid pressure from inside so that the blank takes the shape defined by the matrix. Heating is continued until the plastic is stabilized with respect to heat. (National Carbon Co.; French Patents 773,953 and 773,954.)

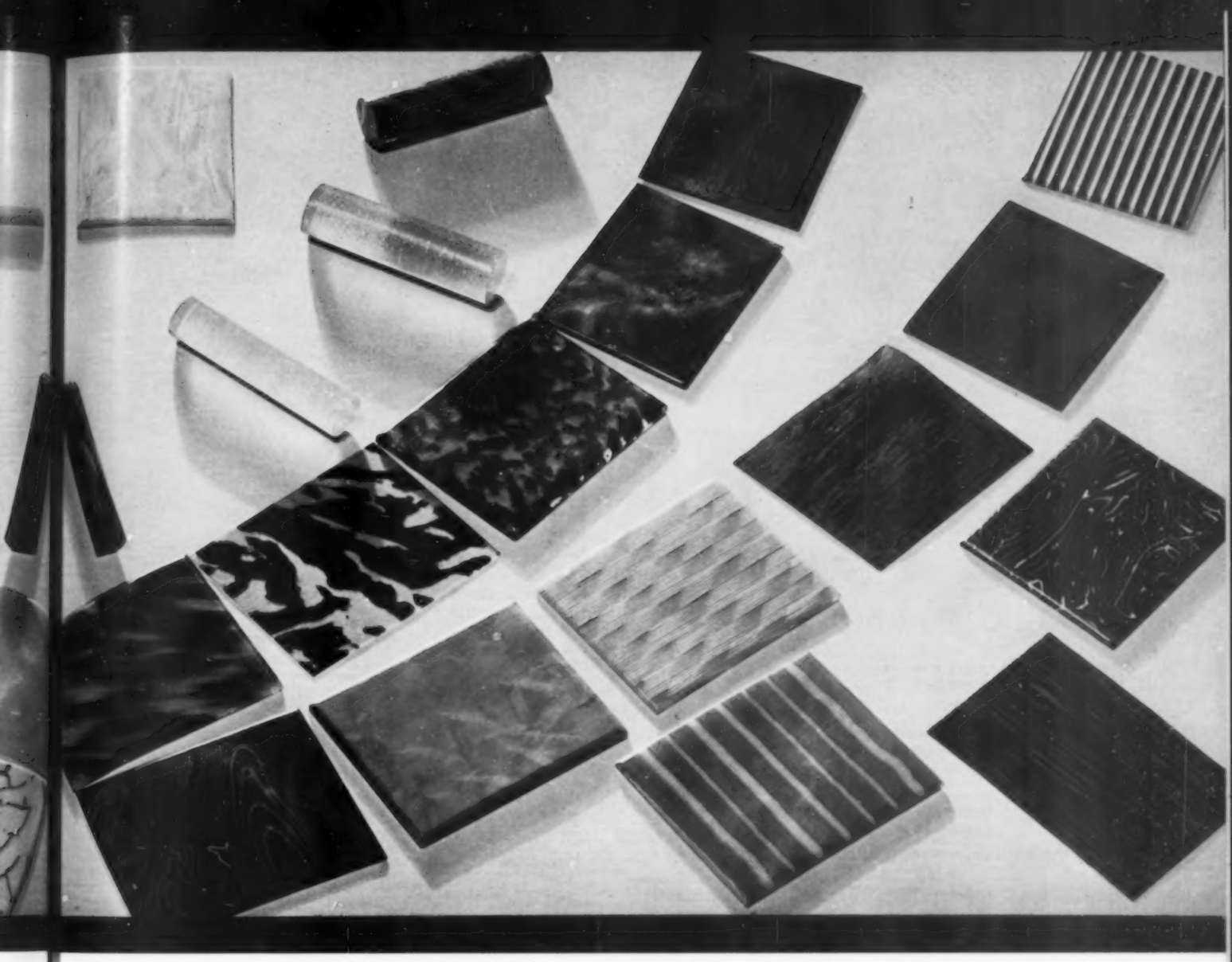


ACHIEVING VARIEGATED COLOR EFFECTS WITH THERMOPLASTIC MATERIALS

by William Bowker
CELLULOID CORP.

THERMOPLASTIC materials, when made without the aid of color or some kind of configuration, are somewhat like plate glass in appearance, with very limited eye appeal. Their application in both industry and art would be materially restricted despite their ideal utilitarian qualities as plastic or moldable substances. By the medium of dyes and pigments, which may be incorporated in the plastic mass in an endless variety of ways, a rather lifeless substance is rendered extremely attractive to the sight, lending its character and beauty to ever broadening fields of utility.

This dressing up of thermoplastic materials is accomplished by various methods depending on the particular use for which the finished product is designed. For many purposes it is only necessary to add a bright, transparent color as in the case of Index Cards, Eye Shades, Signal Devices, etc. Other types of applications demand some degree of opacity with perhaps a distinctive, decorative mottling or variegated effect as in Lamp Shades, Buttons, Knife Handles, Pipe Bits, Tooth Brushes, Toys, Novelties, etc. A more extensive field of application is one in which different basic colors, dyes, pigments or lustrous agents are so utilized as to produce imitations of the most beautiful products of nature such as Ivory, Horn, Tortoise Shell, Mother-of-Pearl, Onyx, Quartz, Marble, Lapis Lazuli, Semi-precious Stones, Rare Woods, etc., which oftentimes in their natural state are not easily adapted for machining or fabrication into the countless articles of which we are familiar. The prohibitive high costs of some of these natural products has also militated against their popular adoption with the result that intensive laboratory research has been instigated to find relatively inexpensive synthetic agents to im-



Thirty-eight of several thousand of the configurations that have come from the laboratories of the Celluloid Corporation. Note the variety of patterns . . . imagine the infinity of colors

part certain specific effects. Such is the phenomenal story of "H SCALE" essence, a synthetic lustrous medium which has drastically replaced the costly fish scale essence used in producing mother-of-pearl effects—an achievement which strikingly illustrates how the skill and ingenuity of the chemist has been drafted to aid the "Plastic Colorist" in simulating and bettering the products of Mother Earth.

To those not familiar with the manufacture of some of the above named thermo plastic products, a brief mention of the methods generally employed to produce certain popular effects or configurations is given below. A more detailed description of Celluloid manufacture in general will be found in an article by George H. Boehmer which appeared in MODERN PLASTICS, Sept. 1934, pages 48 and 49.

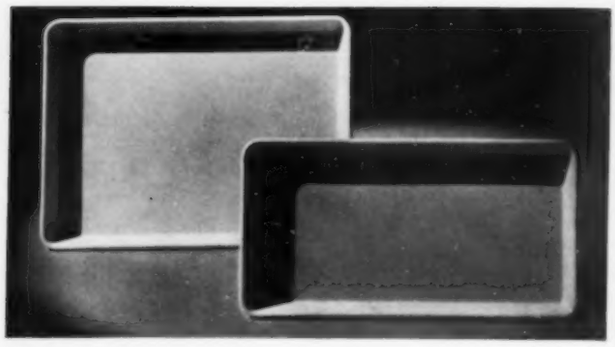
Ivory—Two batches of plastic are made with varying color density to produce the characteristic striated or grained effect so much prized in true Ivory. These two masses in the form of thin layers are superposed upon each other in regular sequence and arranged in a transverse position to form a cake about 50″ x 20″ x 6″. This assembly of alternating laminae is then consolidated under heat and high pressure to form a unitary mass from which sheets of the desired thickness are cut. These sheets are seasoned or cured for varying periods of time, depending on the gauge, under very rigidly controlled temperature conditions. When excess solvent has been removed, the individual sheets are again heated and cooled under pressure between highly polished metal plates. After a final trim and inspection the Ivory sheets are ready for the fabricator.

Tortoise Shell—Most of the popular Tortoise Shell effects are obtained by blending or mottling an amber colored base with a brown colored one in such a manner to give light and dark colored areas or spots of various shapes and frequency; for example, by stirring or partially mixing together the two basic colored materials in a very soft gelatinized state, or when in a semi-solid condition, by mechanically punching the base portion of one mass into the other. In the case of a more complex pattern, recourse (*Continued on page 38*)

PLASKON

CONTAINERS

The reception tendered the new Esquire Shaving Soap containers permits Plaskon to make another notch in its record of packaging successes. Since the containers were introduced by the Lightfoot Schultz Company, Esquire sales have advanced with pleasing uniformity. Men like the unusualness and permanence of their color, their trim masculine design, and the three little knobs on the inside bottom which prevents the soap from slipping after wettings. Molded by Mack.



TRAYS

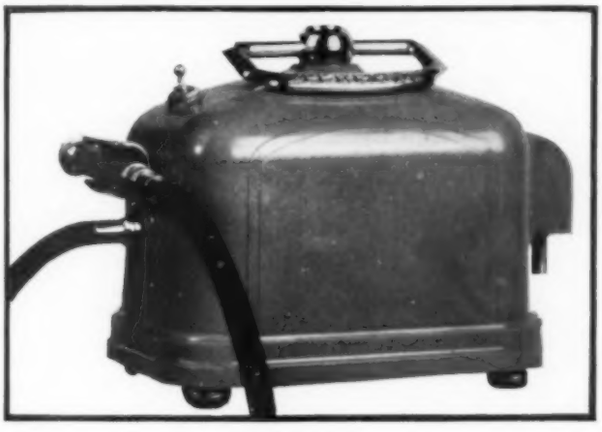
Scrupulous cleanliness of their shops and attractive presentation of their fine products have made the Fanny Farmer Candy Stores a natural place to appease the demands of a sweet tooth. The new Plaskon—molded color—trays for counter and window display are in keeping with that policy. Their pure white color makes tempting displays more tempting while their smooth, sanitary surfaces protect the product and reassure the consumer. And in the long run they are much more economical than the papier maché formerly used. Diemolding Corporation is the molder.

MOTOR HOUSING

The Boydell Electric Manicuring Device is an ingenious one. No less impressive is its Plaskon motor-and-switch housing, a combination of molding art and Plaskon adaptability. Witness the variation of thickness of different parts, ranging from one

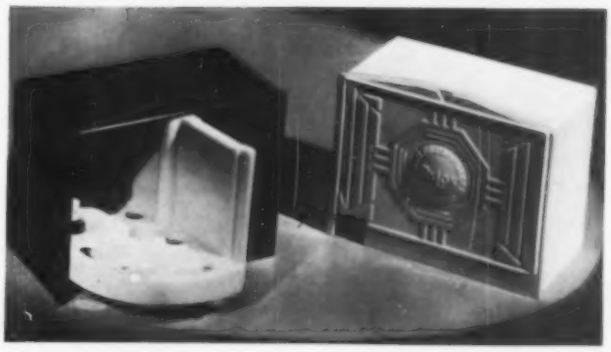
MOLDED COLOR

eighth of an inch to more than one and a half inches; examine the clear Lettuce Green color which no amount of handling will dull or peel; understand that this vibrationless housing is produced in a single molding operation. You will then begin to know why Plaskon is so often chosen for machine housings—by designer, by molder, by manufacturer. Molded by Chicago Molded Products.



HOLDER

A row of toothbrushes left out to dry is not an imposing or particularly hygienic sight. The millions of dust particles and bacteria in the air can quite easily do mischief, to say nothing of possible human contacts. The Bylox Toothbrush Holder eliminates this health risk and at the same time effects an immense improvement in looks over the ordinary holder. A glance at the handsome molded face



design shows that. The rack, which swings inwardly on its pivot, is always of Snow White Plaskon. The case is made in several beautiful colors to permit harmony with bathroom fixtures and wall paints—an alternative which Plaskon's range of color provides. Molded by Norton Laboratories.

SOLKA

Solka is a highly purified cellulose of remarkable qualities, varied and distinctive industrial uses. It is one of the basic ingredients used in Plaskon. Its merits are part of Plaskon qualities.

TOLEDO SYNTHETIC PRODUCTS INCORPORATED

TOLEDO - OHIO

MONOPOLIZING COLOR IN PLASTICS

by Waldon Fawcett

IF ALL hands are agreed upon the importance of color as the supreme factor in the merchandising of modern plastics it will follow that there is justification for a color clinic. The questions which present themselves for such a clinic are legal rather than technical. Even so, the status of color as a sales asset is distinctly on the practical side. And likely to become more so as possibilities are reduced for downright novelty in shape, form and outline. The less the chance for fresh invention in plastics silhouette or pattern, the greater will be the dependence of three-dimensional design upon color and upon color arrangement.

Protection and monoply seemingly apply to the Plastics Industry only in respect to innovations in process of manufacture or innovations in materials used. Yet . . . as Mr. Fawcett shows in this article . . . there is a vast borderland of protection of shape and color, a region beset with hobgoblins through which the careful manufacturer must tread a torturous path toward protection. Some of the milestones on that path are described in this article.

Can color in plastics be monopolized? Is exclusive right in the use of mass color, or a particular scheme, conferred upon the discoverer who saw it first? May a color franchise be obtained via patent, copyright, or trade mark registration? What privileges inhere in a producer or molder for "licensing" the use of distinctive color? What protection is obtainable against color copying or color piracy? How does one establish a new color as being unique and how may he reserve it for his sole use? These are the riddles that are rising with constantly increasing frequency and increasing insistence.

Before exploring specific aspects of color capitalization it is essential to visualize, by way of background, the extent of color use in the plastics industries. Looking in that direction, the controlling fact, which draws our attention at once, is that there is dual employment of color—any color and all colors. On the one hand, there is the use of color as a finish, or for purposes of ornamentation. On the other hand, there is recourse to color for purposes of identification—as a clue to origin of the plastics item itself or a signal of the ownership of the contents of the plastics vessel or container. As will be unfolded as we proceed, the status of color in these two different relationships differs materially.

Perhaps we will gain clearer perspective if we bear in mind that color, translated into plastics for purposes of identification, takes on something of the standing, or, at least, the duties of a trade mark, brand or label. Our inquiry, then, in that quarter has to do with the privileges of color rendered in plastics as a crest or badge. Set over against this symbolic use of color is the employment of color to give character to the "dress" of plastics. Here the element of artistry and decorative value is more prominent and any claim to sole or superior rights of use must hinge upon the equation of unfair competition in trade.

To come forthwith to brass tacks we may as well break the news that on neither count is it easy to persuade any judicial authority or official censor to show sympathy to the ideal. That is to say it is almost impossible to persuade any Federal arbiter of invention that it is possible, at this late day, to evolve any color that is literally new and different from all others. Called upon for a decision on that score the umpires will always hark back to the limitations of the primary colors. Equally difficult it is to persuade the traffic officers, who regulate color in commerce, that any firm or individual has a right to fence off any color, broadly, as private property even if the claimant be a pioneer in the use of the given color in a particular employment or environment.

Given these two-way restrictions upon special privilege in color, the problem which obtrudes is how to make the best of what many members of the industry may regard as a bad bargain. How, or to what extent may color victory be wrested from defeat. For, be it proclaimed, there are ways of escape. Every day sees color turned to private account in the plastics industries. Perhaps the color pickings may be all the richer as a larger proportion of the plastics community learns just how best to detour around the many barriers to color monopoly.

On whichever peg one wants to hang plastics color protection—on the promise of unique ornamentation of design, or the function of an identifying signal—there are two avenues of approach. One of these paths to security in color possession undertakes to clinch a private claim to color by means of authoritative certification, or official pedigreeing. The other route invokes the aid of the national or State laws, and the appropriate public agencies which have been provided to prevent unfair trading—notably, in our immediate case, the "passing off" of goods by simulations of color or distinctive color arrangements.

Further breaking down the (*Continued on page 60*)

NEW METHOD FOR DUPLICATING SMALL WORK

A NEW method for duplicating small dies and molds has been introduced by the George Gorton Machine Co., Racine, Wisconsin, in their new line of Duplicating machines. These are precision machines adapted for reproducing small dies used in die-castings, small drop forgings, and molds used in the rubber, glass, plastics and similar industries.

The new Duplicators are manually operated. They consist of Gorton vertical millers equipped with a tracing arm at right of cutter spindle, and a special table mounted on top of the standard milling machine, running on special compound ball bearing slides.

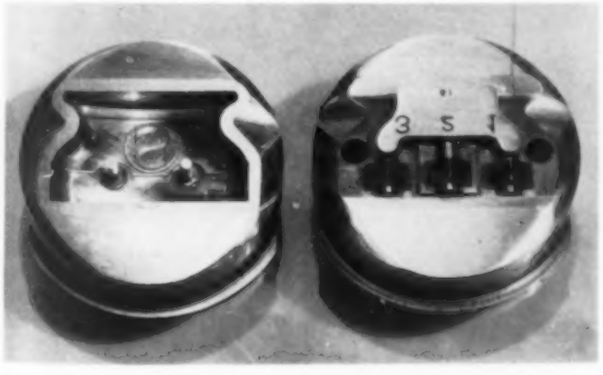
With his left hand the operator controls the movement of both milling cutter and tracer spindles, raising or lowering them as the tracer point follows the contours of the master or die to be reproduced. With his left hand the operator moves the Duplicator table laterally in any direction, causing the cutter to mill out the die as the tracer follows the shape of the master. The die or master may be an actual working die, or a master made of brass, bakelite, fusible alloys or some of the new stone materials for plastic reproduction.

Accuracy of work depends, of course, upon the accuracy of the original master. This can be reproduced within limits of one-thousandth of an inch, or closer in small areas. For such accurate reproduction it is necessary to reproduce from actual dies or molds. The master table is provided with built-in micrometers for accurately shifting the die during process of reproduction, should slight changes in position of various sections be desirable on the new die. Similarly, portions of several originals may be combined in a new die, or sections left off entirely. Holes for ejector pins, etc., can be located from the old die and spotted for drilling, thus eliminating a jig-boring operation.

Gorton Duplicators have been designed primarily for small, accurate work of irregular shape. They will cut deep serpentine grooves, sharp shoulders, steep angles and difficult shapes generally including lettering such as special trade marks. The extremely high spindle speeds (up to 12,000 RPM) permit the use of cutters down to twenty-five or thirty-thousandths diameter, for fine accurate work, and insure smooth finishes with a minimum of hand polishing. For roughing out dies, the Duplicator table can be locked and movement obtained with the milling machine table screws. For this work cutters up to $\frac{1}{2}$" dia. shank can be utilized.

The Duplicator head and table are detachable in five minutes time thus providing a standard milling machine open for any ordinary milling work.

Duplicating a plastic mold from a plaster composition master model



Molds for electrical fittings on sewing machine. The two pins, in the left hand section, are not inserts but were cut integral

Die for cold-molding of percolator handle. A reduction of better than thirty per cent is claimed for mold production time by this method in this instance

NEWS AND DEVELOPMENTS

Reynolds Molded Plastics, Division of the Reynolds Spring Company of Jackson, Michigan, has established sales and service offices in Chicago, Milwaukee, Minneapolis, St. Louis and Rochester, N. Y., to permit of closer contact and speedier service with its customers in these territories. John H. Merrell assumes charge of the Chicago office at 445 Lake Shore Drive. In Milwaukee, Jones W. Garrison will operate from 924 East Juneau Avenue. E. L. Sandberg heads the Minneapolis office at 724 Metropolitan Bank Building, A. O. Woerner the St. Louis office at Boyle and Duncan Avenues and C. E. Hart the Rochester division at 334 Seneca Parkway.

"Chemicals by **Glyco**" is the title of a new catalogue just published by the **Glyco Products Co., Inc.** For quick reference and facility of reading, the catalogue has been divided into sections, each devoted to a particular class of products such as emulsifying agents, synthetic resins, synthetic waxes, solvents, specialty emulsions, etc. Indicated formulas, illustrating the practical use of various items described, help to make the catalogue a handy little reference book. Copies may be obtained upon request.

Designed by **J. Philip Kiesecker** for the Mellon Institute of Industrial Research, Pittsburgh, this desk is constructed of Lamicoid Bonded-Metal, a laminated plastic made by the **Mica Insulator Company.** The lamination consists of a wood veneer, of extreme thinness, treated with a plastic resin and applied to the fabric bonding surface of the metal. This fabric is, previously, bonded to the metal by a patented process which insures permanent adhesion of the various layers to each other. The legs and trim of the desk are of satin finish architectural bronze

The Fifth Annual **National Premium Exposition** will be held at the Palmer House, Chicago, during the week of May 6, under the sponsorship of the Premium Advertising Association. Both space allocations and admission tickets may be secured through A. B. Coffman, Exposition Manager, Merchandise Mart, Chicago.

A new plastic material known as **"Koroseal"** and said to be superior to rubber for the manufacture of certain products has been developed by the **B. F. Goodrich Company** of Akron, it is announced. According to the company's research engineers, the new substance may be molded into any shape, resists the action of various chemicals injurious to rubber and possesses even greater flexing life than rubber. The new product is not expected to replace rubber in general use, it is pointed out.

The Davidge Film Laboratory, Hollywood, California, have created a new method of developing photographs, enabling flyers to put exposed films in process before returning to their naval base or airplane carrier. The tanks are completely molded in Bakelite, in black, mahogany and walnut finishes. Light is kept out of the roto-tanks by a by-pass which also drains the tank of its developing solution. Film capacity is 25 feet of 35 mm. film, or 50 feet of 16 mm. stock. It is stated that this small developing unit is also used by the professional cinematographer for location tests. (Photo courtesy Bakelite Corp.)

The **Oris Manufacturing Company** has taken over the business of Atwood and Oris Manufacturing Company. J. L. Oris is President of the new company and John U. Oris treasurer. The firm will operate as custom molders and manufacturers of insulation from its plant at Thomaston, Conn.

A bucket of special construction, fabricated from Bakelite Laminated material, has been developed by the Synthane Corporation. It is stated that this bucket is particularly useful for firms which handle corrosive materials in vessels of this type. In certain cases, metal buckets deteriorate so rapidly as to make their use extremely impractical. Despite a somewhat higher initial cost, the Synthane bucket offers important economies. Photo courtesy Bakelite Corp.

Vanity cases molded from TENITE

TENITE

offers to the designer of costume jewelry and toilet articles an unlimited range of beautiful color effects, every degree of translucency, lustrous smoothness, freedom from breakage, a secure anchorage for metal parts, and easy machining. The unusual strength, beauty, and workability of Tenite have led to its adoption for a great many other industrial and decorative uses. Write today for an illustrated booklet and samples of Tenite.

TENNESSEE EASTMAN CORPORATION *(Subsidiary of Eastman Kodak Co.),* **KINGSPORT, TENN.**

NEW CLEAR RESINS PRODUCED IN GREAT BRITAIN

REPORTS from England announce the production of two new and remarkably clear plastic resins, one of which may be readily molded and both of which may be cast for machining into various shapes.

One, known as "Resin M," has been erroneously stated to be cheaper than glass. While this statement is without basis, it is true that the resin is as clear as ordinary crown glass and is water white. It is said to have a "softer" appearance than glass and—while much softer than glass in respect to resistance to deformation—it is not fragile. It is reported to be, on the contrary, exceedingly tough and with decided resistance to breakage.

"Resin M" (reported to be of the acrolein type, derived from coal products, presumably coal tar) is a thermoplastic, softening readily at about 248 deg. F. and slowly decomposing at higher temperatures. A lighted cigarette will cause blistering and thin sheets can be set afire with a match but do not burn explosively. Use at temperatures above that of boiling water is not recommended. Optical properties are similar to those of crown glass, but "Resin M" is much less opaque to ultraviolet light. Machining properties are reported excellent, the material being readily turned, carved and cut. Tensile strength is reported very high in comparison with other plastics. Resistance to water is high. The material is not affected by dilute acids and resists alkalies to a greater degree than the phenol of urea plastics. Acetone and other common solvents dissolve it but alcohol and water-alcohol do not. Scratch resistance is on a par with that of the other thermoplastics. Cementing may be done with the liquid resin itself and produces a very strong bond. "Resin M" is a product of Imperial Chemical Industries, Ltd.

The second resin, also a coal derivative, is a result of research conducted by the Department of Scientific and Industrial Research. While still in the experimental stage, it has already been made into some ornamental objects. Its method of production and constituents are said to be entirely different from those of "Resin M," but its properties are reported to be analogous.

COMPACT NEW LUMILINE LAMP BASE AND CAP

A BASE and cap for use with the new Lumiline lamp have been announced by the General Electric Company's Merchandise Department, Bridgeport, Connecticut. The combination makes possible a wide variety of applications in the lighting of sidewall and ceiling fixtures, store counters, and window displays, and in connection with the manufacture of vanity-table lamps, desk lamps, illuminated mirrors, and other items of a similar nature.

The new base, made of durable black or white Textolite, is $^{45}/_{64}$ in. × $1^{3}/_{8}$ in. × $^{13}/_{16}$ in., overall dimensions. Two of the bases, when placed end to end, require but one-half inch of space measured along the lamp axis. Because of its small size, the base permits maximum light from the lamp to reach the surroundings. It can be installed neatly and unobtrusively and may be either surface- or flush-mounted as desired.

The cap, also made of black or white Textolite, clips over the end of the Lumiline lamp. Its circular connector snaps securely into the base and, besides serving as a rigid holder for the lamp, provides all electrical contacts. With the lamp thus held in place, the distance from its center line to the bottom of the base is $1^{3}/_{16}$ inches.

The bases and caps may be used for only a single lamp, or two or more lamps may be placed end to end so that a straight line of light of any length may be obtained. The lamps may also be mounted at an angle. The base and cap are listed and approved by the Underwriters' Laboratories.

AMONG recent new uses for molded plastics for aircraft are a speedometer housing and similar devices for the instrument panel, where savings in weight and absence of corrosion give important advantages over metal; and structural parts in which wood has hitherto been used, such as decorative wall panels in the cabin of a German passenger dirigible, and laminated for parts of airplanes subject to severe mechanical stress. (Revue Generale des Matieres Plastiques, Vol. 10, p. 399.)

A Handsome Theatre Lobby with FORMICA!

...THIS lobby of the Broad Theatre in Newark, N. J., was handsomely and inexpensively modernized by covering the walls with Formica, and by the installation of Formica doors. Metal inlays in the Formica sheet add to the decorative effect which the splendid surface and varied colors of Formica make most attractive.

Formica is very popular with theatre operators. It is thoroughly modern, easy to install, and very durable. It can be washed without injury using any sort of cleaning solution. In addition to lobbies and doors it is used for theatre fronts, linings of the marquise, etc.

Be sure to get an estimate on Formica before you modernize.

FORMICA

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CINCINNATI, OHIO

FOR BUILDING PURPOSES

FOR MATTERS PATENT

The Law of Patents for Chemists, by Joseph Rossman; published by The William & Wilkins Co., Baltimore, Md.; price $4.50.

This is a work both for study, to familiarize the reader with the essentials of patent law, and for ready reference to guide the inventor in practical matters pertaining to his protection. A glance at the contents will give an idea of the scope and comprehensiveness of the book: Following are some of the chapter and section headings:

General Considerations: Why the chemist should know patent law; the chemist as inventor; what are patents worth to chemists? to patent or to keep secret; when to apply for a patent; publication of results; what is a chemical patent? examples of chemical patents.

Obtaining the Patent: The patent application; the claims; prosecuting the patent application; interferences; correcting the patent; reissues; medical patents; food patents; metallurgical patents; biological patents.

Rights Under Patents: Essentials of a valid patent; patent rights; enforcement of patent rights; employer-employee relations; infringement suits.

Miscellaneous Information: Invention records; how to obtain copies of patents; foreign patents; the appraisal of a chemical invention.

Appendices: Glossary of over 200 patent law terms; illustrative official classes; illustrative patent application; annotated bibliography; table of nearly 200 court cases.

This patented spot remover, developed by Plastic Merchandisers, Incorporated, holds the saturated rubbing medium in place by means of a molded closure. Design and execution is by Plastic Engineering Co.

MOLDING door knobs in some of the modern odd designs has been difficult because the molded knobs could not be shaped with the necessary large hole for the shaft of the knob, without a large breakage loss in removing the knobs from the molds. A new method for molding such shapes gives the knobs a first pressing without any hole, and the hole is then formed while the press is closed, by a screw device which enables the operator to force the forming rod into the partially molded knob. There is practically no breakage in removing the finished knobs from the molds. (Kunststoffe, Vol. 24, p. 293.)

PLASTICS AID THE AMATEUR MOVIE PHOTOGRAPHER

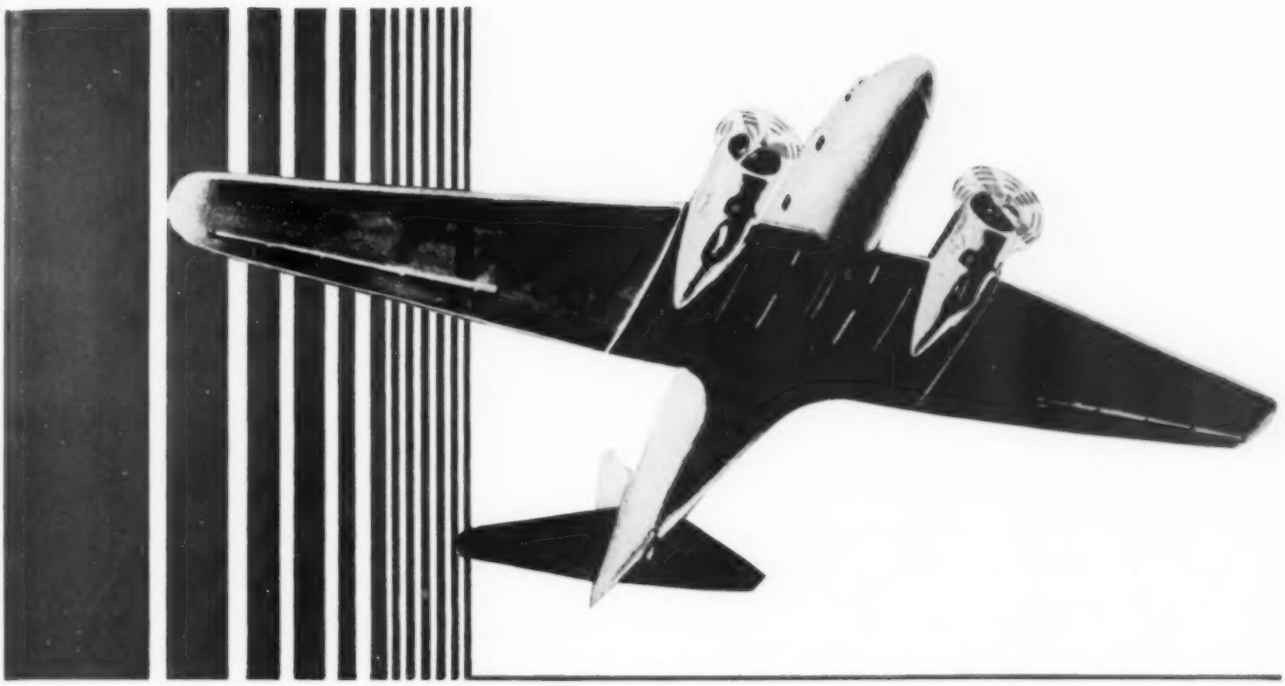
A NEW radial "wipe" device has been designed by Du-Morr Laboratories for use with the Ciné Kodak Special Movie Camera. This device enables the amateur photographer to secure the same effect that is used in professional photography where one scene is wiped off the screen by the next, thereby avoiding abrupt change from one scene to another.

A laminated phenolic is the main material of construction. The device consists of a $^1/_8$" thick, dull, black laminated base which has a $^1/_2$" lip on one side to provide rigidity and light weight. The base is fastened to the tilting tripod head by screwing the tripod handle through a steel bracket on the underside of the base.

The camera is mounted rigidly on the wiping device by the tripod bolt which protrudes through the Bakelite Laminated into the camera. A fan, made of $^1/_{16}$" laminated and covered with black velvet on the face toward the camera, is mounted in front of the lens so that it can revolve, shutting off the field of the camera at the end of the first scene.

The movement of this fan is synchronized with the camera, being actuated by bevel gears, one of which is mounted on the axle which protrudes from the side of the camera. The other gear drives a shaft which revolves in Bakelite laminated supports. This shaft is free to be shifted forward or backward so that the gears may be engaged or disengaged at any time. Rotation of this axle is translated laterally to the fan axle by a spring belt running on Bakelite laminated pulleys.

In the actual making of a "wipe," it is necessary to produce several frames on the film, in which each successive frame has a greater portion of the area blocked off, or unexposed. With the Du-Morr Radial Wipe this process of cutting the field of the camera is accomplished by the rotation of the fan in front of the lens. This is made possible by engaging the gear of the wiper with the gear on the camera while it is recording the closing action of a scene. When the fan reaches ap-



SPEED---in Delivery---Molding and Sale!

Friday, 9 A.M., December 21st

Christmas four days away. Unusually large sales on the Pacific Coast have exhausted the molder's supply of *Unyte*. We receive his wire asking for rush air express shipments.

Friday, 12 Noon, December 21st

Complete shipment of *Unyte* air mailed to the Pacific Coast.

Saturday, early A.M., December 22nd

Unyte shipment reaches the western molder, enabling him to immediately manufacture and . . .

Monday Morning, December 24th

Manufacturer delivers the finished articles.

Monday, Noon, December 24th

Finished articles are in the hands of the customers.

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proximately the upper position both the camera and fan are stopped at the same time.

At this point the position of the fan is noted on the index scale in the upper right corner of the fan. Next the film is rewound 24 frames with the shutter closed. Then the fan is placed in the same position it occupied at the end of the first scene, and the camera is ready to take the next scene. With the fan in place, and the gears meshed, the camera is started when the action begins. This causes the fan to revolve out of camera range, gradually revealing the second scene, at which time the gears are disengaged allowing the operator to continue shooting the ensuing action until another "wipe" is desired, when the process is repeated.

The resulting effect is that one scene is wiped off the screen by the next, the line of demarcation being a straight line which moves from left to right, radially across the picture. This action takes one second at the normal projection speed of silent movies.

When this device was originally designed it called for metal. It is interesting to note that with the use of laminated phenolics the weight was reduced from 2½ lbs. to 15 ounces by its redesign. Also, the assembly was greatly simplified and at the same time a more durable finish was obtained by using laminated plastic instead of lacquer coated metal or wood.

The Du-Morr Radial Wipe is being retailed through the forty-three Eastman Kodak stores in the United States and through the Canadian Eastman Kodak Company. The materials used are Bakelite Laminated, fabricated by the Formica Insulation Company.

ACHIEVING VARIEGATED COLOR EFFECTS WITH THERMOPLASTIC MATERIALS

(*Continued from page 27*) is had to an accurate cutting of the semi-solid color components into different shapes and geometrically arranging them in a series of angular steps prior to the final solidification in block form. Thermoplastics in the Tortoise Shell colors and configurations have found a very fertile field of utility in the fabrication of Optical Frames, Toilet Ware, Knife Handles, Hair Pins, Novelties, etc.

Mother-of-Pearl—Mother-of-Pearl and many other lustrous effects are secured by adding to the basic colored mass a quantity of "H SCALE" pearl essence, or some very minutely divided metallic flakes, which, when properly oriented with their flat reflecting surface approximately parallel to the surface of the plastic base, produce a play of scintillating reflections. When combined with basic colors they truly simulate the life and lustre of the finest specimens of natural shell pearl. These nacreous and multicolor sheen effects are very widely employed in the manufacture of Toilet Ware, Fountain Pens, Pencils, Knife Handles, Tooth Brushes, Buttons, Novelties, etc.

Onyx and Quartz—In the creation of these beautiful rock formations, Nature has labored through eons depositing, usually from the waters of mineral springs, layer upon layer of calcium carbonate combined with various metallic salts. This blend of inorganic deposits slowly became hardened and at later times, either as a result of the earth's contraction or volcanic disturbances, developed the characteristic fractures or fissures into which iron, copper or other metal bearing water gradually seeped in to produce the beautiful stains so pleasing to the eye. Because of the tremendous pressures to which the mass was constantly subjected, solidification finally took place. Thus, in reproducing the rarest and most attractive specimens of onyx and quartz, the Plastic Colorist has had to follow nature's principles, but achieve the same ends in an infinitesimal length of time. In addition, he imparts to his handiwork the valued thermoplastic properties which permit fabrication into an endless variety of articles without being confronted with hardness, brittleness, checks, or the lack of moldability of the natural products. The Onyx and Quartz effects produced in Celluloid and Lumarith have been developed in a large variety of tints and configuration that are in keeping with the modern color trend. They find a large field of application in the latest designs of Toilet Ware, Knife Handles, Pen Stands, Bag Frames, etc.

Crystal—This type of coloration in thermoplastics has been the subject of intense research and development. The finest, so-called clear transparent, or crystal effects are obtained by adding minute amounts of the most stable of the synthetic inorganic colors to a plastic mass consisting of chemically tested components; the whole mass being then thoroughly mixed, rolled and otherwise manipulated to insure a perfect dispersion of the finely divided insoluble coloring medium. Thermoplastics of this color class are employed as the binding agent in non-shatterable or laminated glass product, which is finding a constantly increasing use in Automobiles, Banks, Ships, Railway Cars, Safety Goggles, etc. The Button, Novelty, Umbrella Handle and Tool industries also consume enormous quantities of Crystal material in the form of rods, sheets and tubes. For these applications the crystal clear transparency of celluloid and similar materials, coupled with their ease of fabrication with respect to turning, drilling, threading, carving, molding, polishing and surface tinting, permit a wide choice of design, style and decoration not possible of attainment with other hard and refractory transparent products on the market today. Another worthwhile mentioning application of Crystal and amber colored thermoplastics is in the fabrication of tool handles. Here the excellent insulating qualities, combined with strength and resistance to corroding influences, have aided materially the manufacturer in his constant search for safer and more efficient tools.

While the examples that may be given appear limitless, it must be stated that the numerous special dyes, pigments and mediums employed in the coloration of thermoplastics have been obtained only by diligent research of Nature's products in the laboratory of the

RESINOX CORPORATION

(SUBSIDIARY OF COMMERCIAL SOLVENTS CORPORATION AND CORN PRODUCTS REFINING COMPANY)

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NEW YORK, N. Y.

NEW YORK, N. Y.

January 21, 1935

[redacted]

Attention: [redacted]

Gentlemen:

In your letter of January 18th you asked if RESINOX can be used for molded bottle closures. It is my privilege to inform you that the Resinox Corporation manufactures a splendid molding material for this purpose.

We do not claim that all grades of RESINOX are satisfactory for use in molding closures. In many instances there is no question but that it is necessary to use a material especially devised for a given purpose in order to obtain the very best results. Our closure material is a special development. It is the result of extensive research, molding experiments and thorough testing of experimental closures.

The closure material which was finally developed has excellent molding properties, including an exceedingly rapid cure. A finished closure made from this molding powder is lustrous in appearance. It is odorless and resistant to water, alcohol and dilute acids and alkalies. It is available in a variety of beautiful colors.

Under separate cover, I am sending you samples of RESINOX closures which have been molded by various closure manufacturers. In many cases these bear embossings from which you will easily recognize the users for whom they were made. The samples will undoubtedly indicate to you the large number of important companies which have specified RESINOX for use in their closures because of the consistently satisfactory qualities which they have found in their "made from RESINOX" closures.

We suggest that the samples which are being sent be submitted by you to every reasonable test which a closure may have to stand. We would particularly call to your attention the great strength of the RESINOX closures, which prevents their breaking when screwed tightly on bottles and also the lack of odor, which makes it impossible for your product to take on a foreign taste or smell due to the closure.

We shall be more than pleased to give you any further information which you may desire, or, if you prefer, to discuss the matter with you at your convenience.

Cordially yours,

C. L. Gabriel

C. L. Gabriel
President

/MJ

"Plastic Colorist." In addition to the constant effort expended in seeking new agents which impart beauty, lustre and iridescence the vital importance of stability and permanency of color also has necessitated persistent investigations. For example, base colors which are admirably suited to one particular type of thermoplastic have often been found valueless for other types. This situation has led to very close cooperation between the manufacturers of the basic colors and the maker of plastics, resulting in a comprehensive understanding of the former with regard to the particular requirements of the latter. The manifold advantages of such collaboration was probably too little appreciated in the early days of plastic developments. Because of the then extremely secretive policies of the industry in general, important research and development work was unfortunately retarded. The modern policy of close and frank cooperation between allied industries has influenced to a very marked degree the truly remarkable modern accomplishments of the plastic industry. As a result, both inorganic and organic coloring matters have been most scrutinously studied and standardized with the aid of present-day facilities to establish their suitability for cellulose derivatives plastics.

From the few illustrations given above it becomes readily apparent how the thermoplastic and readily workable qualities of such materials as Celluloid and Lumarith are utilized to advantage in realizing so many versatile configurations and color effects. Kneading, filtering, rolling, pressing, sheeting, restacking, etc., are all processing steps fortunately accessible to the Colorist for the manifestation of his artistic skill and ingenuity. The delicate mottling, gradual shading, scintillating lustre, depth and richness of color, translucency, vivid and pastel tones are difficult to describe in words, as also the many other patterns often referred to in the trade as corrugations continuous and broken striations, drift formations, herring bones, checks, moires, plaids, stripes and mosaics.

While the foregoing has pointed out very briefly the methods of imparting color and ornamentation to the plastic mass itself, mention must also be made of "surface tinting" operations. By the use of soluble colors in suitable liquid vehicles the finished plastic in the form of sheets, rods, tubes or fabricated articles can be dyed to most any desired shade or combination of color. The particular requirements of the button and novel industries, as related to the style trend and color vogue in women's wearing apparel, has led to an enormous use of this economic method of coloring. In the hands of the fabricator the translucent whites, creams, grays, and crystal plastics in the form of buttons, buckles, clasps, dress and millinery ornaments, etc., are readily tinted to match or contrast with the color of the very diversified field of fabrics and leather.

Truly the color and configuration possibilities of the pioneer Cellulosic thermoplastics are endless in variety and act to serve as a goal for all present-day substitutes to attain.

THE SAMPLING PRINCIPLE

(*Continued from page 24*) dark in the same order as in the small sampler folder.

The second step in the development of the Gift Set sampler set was a paper panel which replaced the more costly folder. On the paper panel were printed, as before, instructions for use ("orangey lipstick in bright daylight or for beach wear where the dazzling sunlight has a bluish cast and makes ordinary lipstick look ghastly," and so on). Also printed on the paper panel was the price of the Christy lipstick, and a mention of Christy Compact Rouge, Cream Rouge and the Christy Cosmetics, Inc., name and trade mark.

These are specified for counter use: a lady can hold this slender panel up to her face and see in a mirror which shade best becomes her face and costume. They are packed, four to a box, with each dozen lipsticks. And they are purely promotional items.

These proved so satisfactory that Mr. Christie decided to continue the sampling principle, but to continue it in a way that would bring some money back instead of its being purely and simply an expense.

The result was the molded Gift Set. This set holds samples of both lipstick and rouge, matching shades being placed opposite each other, with the number marked in white on the base between.

Into sixteen depressions in a specially molded base of black bakelite (molded by Boonton Molding, New Jersey) are poured one sample each of the eight lipstick shades and eight rouge shades. The pouring is done with machines, designed especially for the purpose, while lipstick and rouge are both hot.

Into the base, which has a beveled outer edge to hold a silver paper cover, have been molded both the numbers of the shades and the name of Christy Cosmetics. On the under side is the name and description of the lipstick and rouge, also molded into the black bakelite.

By means of clever undercutting of the mold beneath the bevel, the actual thickness of the plate is greatly reduced, and the cost is cut so that each plate costs only seven and a half cents. The plate is economical also in that it serves as the bottom of the box, and there is only the additional cost of making the paper cover.

The covers, printed in black on silver, are made by Warner Brothers, Bridgeport, who machine them in quantities, and by Perfumers and Jewelers Box Company, which makes small extra orders by hand, at a correspondingly higher price than the machine-made covers.

A thorough study of the effect of light on color preceded the selection of the eight shades of lipstick and rouge presented in the Christy assortment. A special lipstick with a brownish red cast, for the brown-eyed redhead, is one of the most unique Christy shades. Another unusual color—a bluish red—gained some fame as the "speakeasy" lipstick, because it could be worn to such advantage in the subdued amber light of most speakeasies. Numbers 1x, 1, and 2 are good for day-

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This is *the* standard work on plastic molding . . . used by molding engineers yet simple enough for the layman who specifies and purchases plastic molded parts. Profusely illustrated, this volume contains over two hundred pages of pertinent information on every type of plastic, including full tables of chemical and physical properties, instructions on practical design, cost reduction by advance planning, etc., etc.

Use MODERN PLASTICS to bring you current developments. Use this book for the necessary background of invaluable information.

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light. Number 2 particularly for beach wear, for brilliant sunlight. Number 3 for ordinary night light, Number 4 for a little darker night light, and Number 5 for the darkest. Naturally, the darker the complexion of the wearer, too, the darker the lipstick. And with dresses or suits of various hues, the shades are specially chosen.

A second application of plastics to Christy's problem is being considered, but has not yet been undertaken. We refer to the possibility of molding the giant display lipsticks which are set up in graduated sizes like organ pipes to give a dramatic and forceful display visible from a distance. At present these mammoth things, with about half of the colored stick showing at the top, above the base of black and chromium, are made of wood and metal. Yet it is quite possible that an even more striking and more handsome display would result were the bases of a molded material.

EVOLUTION OF AN INDUSTRIAL PRODUCT DESIGN

(*Continued from page 21*) I-T-E equipment inside. No sight was lost of the mold maker's problem in making dies that would be economical and practical.

Fig. 6 shows how well this careful consideration for details has enabled the company to produce an attractive assembly of units in the panel board. In the panel board the circuit numbers stand out well because they are plain, heavily lined figures, contrasting with the jet black Bakelite molded background.

Results: The Itelite thermal circuit breaker was a new product for I-T-E and was introduced in a highly competitive field. Orders are well beyond the quotas originally set. The factory has been pressed to production greater than the capacity provided for this new department . . . and the sales force has reported many times to the main office, "The design is selling Itelite."

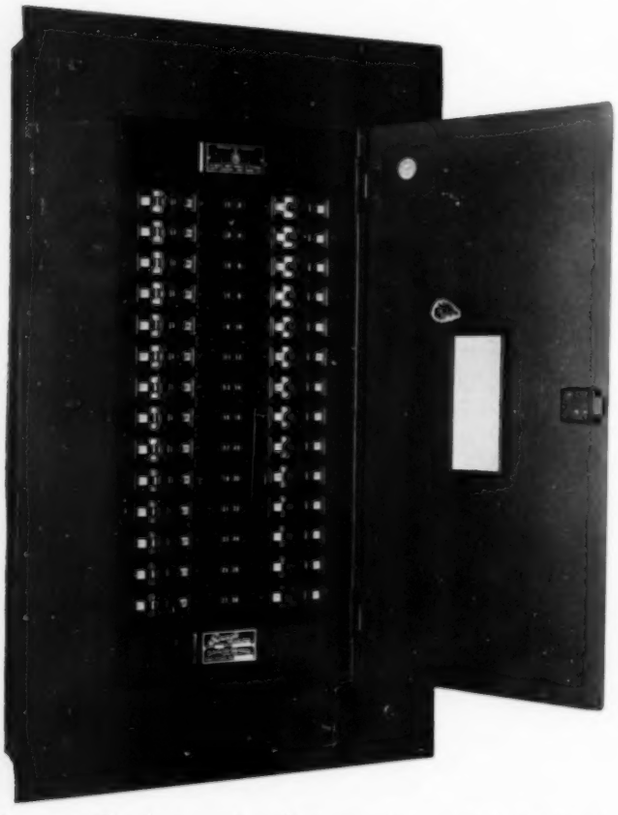


Figure 6—The final result—effective, and successful, functional design

CAST PHENOLICS AND THE DESIGNER

(*Continued from page 20*) Similarly, the case itself might have been made thinner and lighter by molding, but this would have eliminated the desired appearance of solidity unless a back plate was likewise molded and then attached to the case after the movement had been inserted. By using a rectangular cast phenolic block, machining operations were limited to the drilling of the thirteen holes in the face (a step that would, of course, have been eliminated by molding) and the turning of the large recess in the rear which permitted of the insertion of the clock movement. In view of the short run contemplated, cast phenolics offered decided advantages.

Color variation was, of course, possible with either method of fabrication. Here, though, the consideration of the manner of sale led again to the choice of cast phenolics. Molding would have required that a large number of parts of each color be kept in stock to insure prompt delivery. However, it was impossible to predict: first, the degree of acceptance the clock would achieve; and second, the proportion of each color that would be desired by the merchants handling the item and the purchasing public. By utilizing cast phenolics, it was possible to keep stock down to minimum, to purchase blocks of desired size in small groups, and to machine these to order. The simplicity of machining and assembly—a factor worked for in planning the design—made possible almost immediate deliveries when working on this basis. Needless to say, the possibility offered the customer to select the exact shades and color combinations wanted are an important factor in the sale of an item in this price range. Through the use of cast phenolics, it was possible to manufacture a number of standard color combinations—black base and white top, black or red base and red, green or French blue top—and to supplement these with an almost infinite variety of other colors on a "to order" basis.

Other considerations affecting the selection of materials, according to the designer-manufacturer, were the brilliant translucency and high color values of the cast phenolics. Naturally, this and all the other factors mentioned apply with varying weight to other instances.

In many cases both cast and molded materials may be indicated, particularly where long runs are contemplated but where it is desired to first test the market for sales possibilities. The use of cast phenolics, in such instances, permits not only of a single testing operation without the incurring of mold costs, but also permits of the testing of variations of the design, one against the other. When the final choice of a successful design has been made, it may then prove less expensive to mold for the long-run.

WHICH PLASTICS TO CHOOSE? VI

This is the sixth in a series of articles describing the various plastics and telling about their applications. Previous articles dealt with the phenolic, urea and cellulose acetate and cast phenolic types of plastics and the pyroxylins. Subsequent articles will deal with other types of plastics, each of which has important industrial applications.

COLD-MOLDED PLASTICS FOR HEAT-RESISTANT AND ELECTRICAL APPLICATIONS

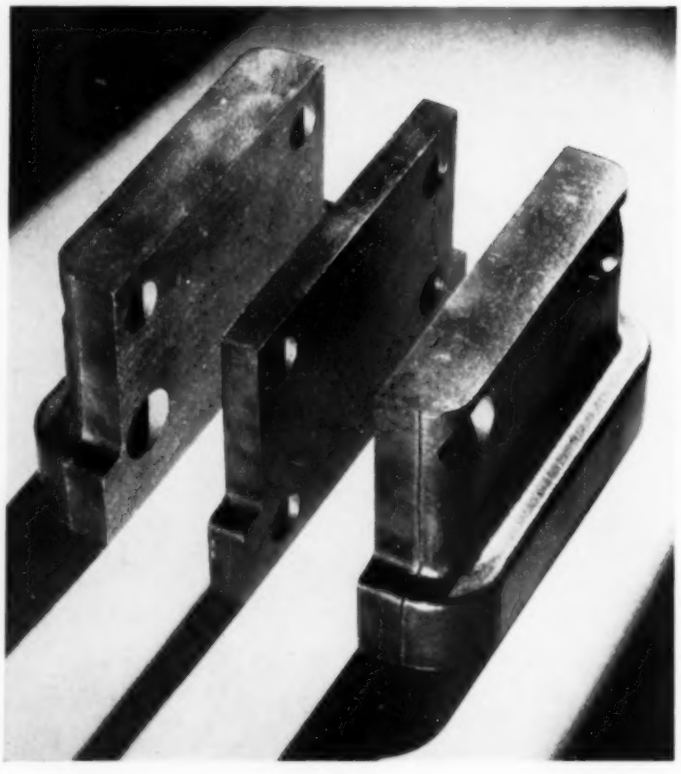
by Herbert Chase, M.E.

COLD-MOLDED plastics have carved and still hold for themselves a distinct and not unimportant niche in the plastics "Hall of Fame." Though they have their limitations, they provide very definite advantages for particular applications. Although in some instances they compete to a limited extent with phenolic plastics, in others they make use of phenolic binders and thus partake, to some extent, of the advantages gained by the hot-molded phenolics. For the most part, however, they are used either in applications where heat resistance is a factor or as electrical insulators of a type which would be too expensive if a corresponding quantity of hot-molding material were required.

Cold-molded plastics involve, perhaps, a wider range of materials than any other type. As with most molding plastics, they consist of a filler to which is added a binder. This latter acts more or less as an adhesive, causing the particles of mineral filler to cohere. As a rule, the filler is largely or wholly asbestos fibre and this filler may constitute eighty-five per cent or more of the weight of the molding compound. As its specific gravity is high (as compared to wood flour and other fillers commonly used in hot-molding compounds) the finished product is quite heavy. It is not so strong mechanically, section for section, as are good hot-molding materials and cannot be fabricated in sections so thin. Finish is also inferior to the hot-molded materials and since the only colors usually available are dull brown, grey or black, decorative applications are rarely made, although applied finishes are sometimes added when a decorative effect is desired.

In general, cold-molded plastics are classified either by the type of binder employed or by the degree of heat resistance they are designed to withstand. Makers often divide them roughly into non-refractory and refractory types. The non-refractory forms usually employ Gilsonite, asphaltum or pitch as the binding agent. Drying oils and other ingredients are often added. As already noted, a phenolic binder may also be used. Such binders involve certain organic materials which are subject to decomposition under the influence of rather high temperatures, and some of them may soften or even burn under certain conditions.

Nevertheless, some of the good non-refractory cold-molded products withstand temperatures over 600 deg. F. without serious effects. Of course, if a phenolic binder is employed, it is converted in the baking process which follows the cold-molding, to an insoluble and infusible state, much as it is in hot-molding, though with less rapidity. Cold-molded products with phenolic binders are seldom recommended for continuous exposure to temperatures above 400 deg. F. However, the following statement, by one supplier, indicates that cold-molding or phenolic-binder materials offer decided opportunities, in some instances. "Our cold-molded grade has an exceptionally fine finish comparable to hot-molded material. It is practically unaffected by temperatures up to 250 degrees centigrade and our tests show that



Cold-molded parts of Cetec No. 77 (non-refractory type) produced by General Electric for a well-known Boston manufacturer of circuit breakers. Heavy and substantial parts of this kind are typical of cold-molded products

operation at a temperature of 300 degrees for forty-eight hours results in a ten per cent decrease in mechanical strength. Operation at higher temperatures results in more rapid loss of strength. Its average flexual strength is six thousand pounds per square inch. The material is unaffected by water, mineral oils or weak acids and is attacked by alkalis and strong acids. Because it is slightly stronger and retains its strength better after operation at high temperatures than ordinary grades of non-refractory cold-molded compounds, this grade can be molded in thinner sections than most cold-molded compounds."

The second general type of cold-molded plastics is quite refractory and in certain form will withstand temperatures as high as 2000 deg. F. without failure from heat. Again the chief constituent is usually asbestos, but the binder is generally mineral in character. It may be Portland cement or a cement-like material, or a silica-lime mixture. In some instances some organic material may be added in the mix or a finish may be applied to minimize water absorption or improve dielectric properties or both. Such additions would, however, be affected if subjected to the red heat or the arcing which the basic refractory compounds resist.

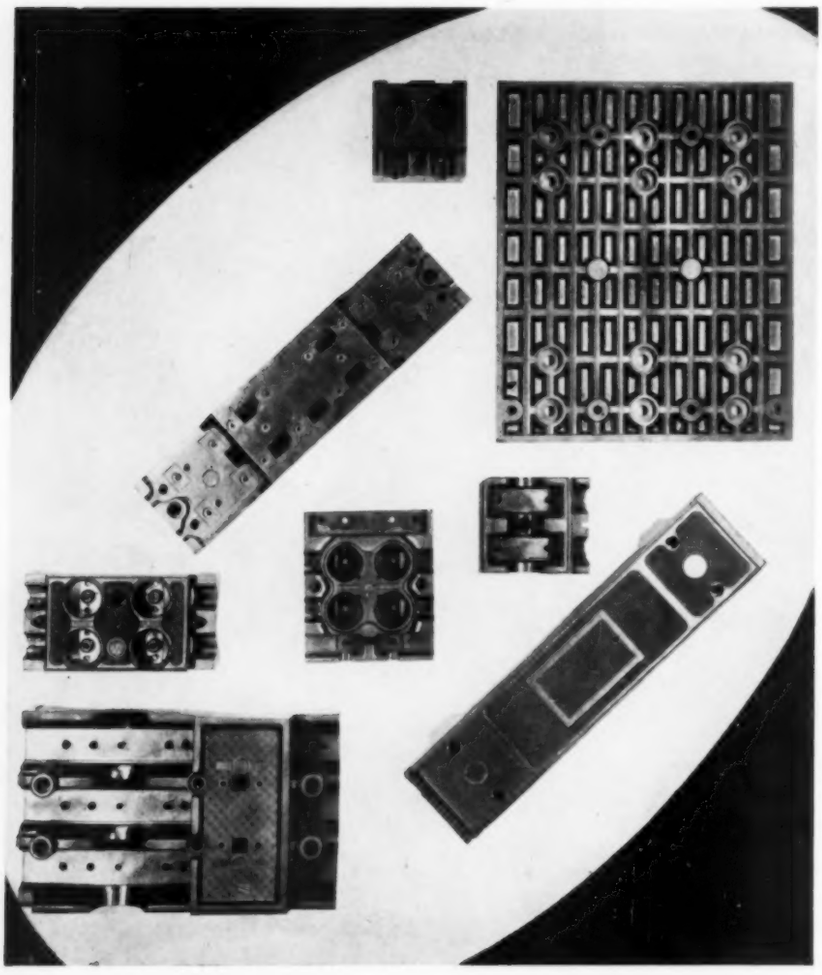
Cold-molding compounds were extensively used before the hot-molding phenolics gained extensive use. They were, however, often found so lacking in strength or so brittle as to be considered rather unreliable. Such faults came near to ruining their reputation and spelling their exit in favor of hot-molded plastics, but such a fate was avoided by research work in which the cause of brittleness was discovered and afterward eliminated by careful control in manufacture. Impact and bending strength is still much below that realized in the phenolic hot-molded materials, but it is ample for the usual types of applications, especially as it is common practice to use thicker sections than are general in hot-molding.

An important advantage of cold-molding is the rapidity with which it is effected. The molding cycle is much faster than in hot-molding because the material does not have to be left in the mold to "cure" under the influence of heat. All that is necessary in cold-molding is to press or ram the material into the mold and then immediately eject the molded piece. A piece so molded is not ready for use, as in hot-molding, but is sufficiently compressed to permit it to be transferred in pans or racks to curing ovens where many hundreds of pieces are usually cured at one time.

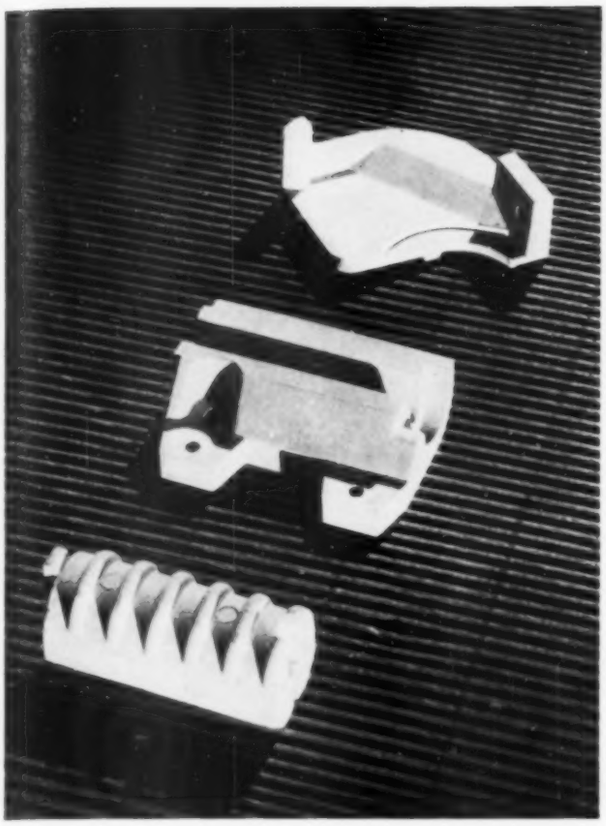
Since molding is done so rapidly, it is possible to get a large production from a single-cavity mold within a comparatively short period. Hence the charge for labor and press is minimized. In addition, and this also is important, it is seldom necessary to make a mold with more than one cavity to get a high output. This means that the cost of the mold is minimized. Thus the process is particularly advantageous where the total number of pieces is comparatively small.

It is possible, of course, to secure an equal production rate in hot-molding, especially of small pieces, and this is often done by using molds with a large number of cavities, but the cost of such molds is seldom justified unless a large total production is required. In such an event, however, the hot-molded piece may be equally inexpensive, especially as the quantity of material can often be minimized by using a thinner section than is feasible in cold-molding while still retaining adequate strength.

Large companies (such as the General Electric Company) which make many moldings for use in their own products besides doing custom molding for other companies, have extensive facilities for producing both hot-molded and cold-molded products. They naturally select the process which gives the most satisfactory results at the lowest cost. The fact that both proc-



A group of electrical parts produced by the Garfield Manufacturing Company from Gummon, an asphaltic-binder product well suited to temperature resistance



Parts molded from General Electric's Cetec No. 94 (refractory) for applications in which high temperatures or arcing are encountered. This type of material is resistant to temperatures up to 1300 deg. F.

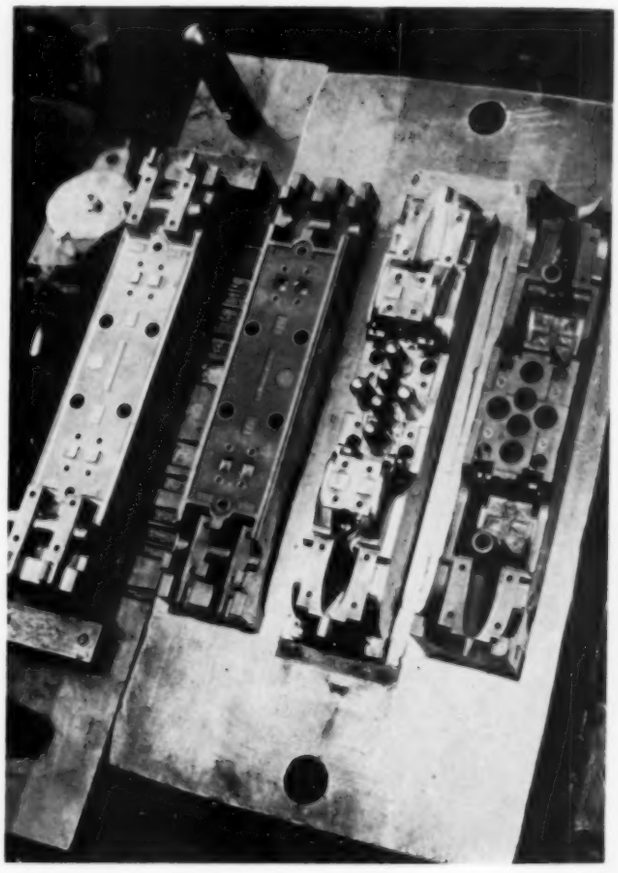
esses are continued is sufficient evidence that there is ample economic justification for both types of product.

It is quite likely to work out that pieces which are subjected to considerable heat or to arcing in use or which are rather bulky, not subject to weight limitations and required in comparatively small quantities, will be cold-molded. A very large proportion of these are for electrical applications, usually in types of equipment in which a lustrous finish is not essential. As compared to this, hot-moldings comprise a much wider range of products but are not subjected, in general, to temperatures much above 400 deg. F. Also, in hot-molding many colors are available and, if necessary, fabric fillers (which add greatly to strength) can also be employed.

In respect to raw material supply, there is an important difference between hot- and cold-molding materials. The former are made by a comparatively few producers who supply the entire hot-molding trade. The cold-molding materials are usually made on the job by the molding concern. This requires specialized equipment for preparing and controlling the quality of the compounds used. Cold-molding requires special molding equipment and specially equipped ovens designed for curing. In consequence, there are relatively few cold-molders and some of these specialize largely or wholly in cold-molding. In addition, there are differences in mold construction and, as some of the com-

pounds used are quite abrasive, mold wear is likely to be more rapid than in hot-molding.

There is a wide variety of cold-molding materials available. They are marketed under such names as Aico, Cetec, Electrobestos, Eternit, Gummon, Hemit, Inlite, Pyroplax, Tegit and Thermoplax. Some molders employ more than one type of material sold under the same name (as with Cetec, available in both non-refractory and refractory types), whereas others use different names for different types. Thus, Thermoplax, having a binder of pitch and certain oils or of phenolic materials, is designed for maximum temperatures of 400 to 700 deg. F., (depending on the formula used), whereas Pyroplax, likewise made by Cutler-Hammer, and employing an inorganic cement-like binder, is good for maximum temperatures up to 1000 deg. F. Again, the Garfield Manufacturing Company makes three types of cold-molding material called Gummon, for maximum temperatures up to 600 deg. F., Tegit, for maximum continuous temperatures up 350 or 400 deg. F. and Hemit, for temperatures reaching 1100 to 1500 deg. F.



An intricate but typical cold-molded part produced by the Garfield Manufacturing Company from Gummon, an asphaltic-binder product. Two moldings, to show both sides of the piece, as well as the mold for producing it, are clearly seen

Besides varying in degree of heat resistance, the cold-molded plastics vary also in strength, water absorption, color, finish and other physical and chemical properties.

In general, the materials are chemically inert and are not subject to shrinking, cracking, warping or deterioration with age under normal service. Some types, though dull in natural finish, are capable of taking a high polish. The degree of moisture absorption varies greatly and with it the dielectric properties. When moisture absorption must be minimized, this can sometimes be accomplished by impregnation with water-resistant materials.

Since composition varies so greatly in different makes and types of cold-molded materials, it is natural to expect a wide range in the physical properties. That this is the case is indicated by the data given in an accompanying table. For this reason when cold-molded products are being purchased care should be exercised in indicating precisely what properties are desired or at least what conditions must be met in the service to which the molded part is to be put.

Moisture resistance varies to some extent, not only with the binder employed, but with the grade of asbestos used. Long-fibre asbestos, though adding to strength, is said to have a tendency to increase moisture absorption somewhat as compared to short-fibre or powdered types. Types having asphaltic binders are less expensive than those using phenolic binders, but the latter are superior, sometimes by 50 to 75 per cent in strength (tension and compression) and to a lesser degree in impact strength.

Refractory types of cold-molded materials, as their name indicates, are used chiefly in applications where high temperatures are commonly encountered or where resistance to fire or arcing is required. In most cases they have moderate dielectric strength, but this is usually below that of the non-refractory types and considerably below that of the common hot-molded plastics.

Most of the refractory types use a Portland or other cement binder and, in general, the maximum continuous temperature for which they are recommended ranges from 1000 to 1300 deg. Silica-lime mixtures, sometimes employed without Portland cement, are sometimes recommended for temperatures up to 1500 deg. F. and have been used at even higher temperatures. This latter type is, however, not so strong as the type containing Portland cement, being about on a par with the non-refractory asphaltic-binder type in compressive and transverse strength.

Refractory types are somewhat porous and absorb considerable moisture unless impregnated with moisture-resisting material. Arc resistance is high and, as no organic material is present unless added in impregnation, arcing does not produce a carbonized track of low resistance, as with many molding materials.

In general, cold-molded plastics are not recommended for parts that require very thin sections or in which high dielectric strength is needed. The latter may run as high as 130 volts per mil in certain non-refractory forms but is generally more nearly 60 volts per mil, and in the refractory type may be 40 volts per mil.

Non-refractory cold-molded plastics are employed, as a rule, for such parts as wiring devices, connector and

heater plugs, switch bases, contact supports, conduit outlets, complicated panels, rheostat bases in which the maximum temperature is 600 deg. F. or lower, controller parts, insulating bases for percolator and other handles exposed to high temperatures, for fuse plug bodies and for many other similar parts. As bases or boards for mounting relays, controllers, circuit brakers and like parts, they are lighter, as well as more resistant to heat and to weathering than marble or slate and, of course, they can be worked readily and molded into complex shapes which are not feasible with slate or marble. Metal inserts are readily molded in place when required and holes for screws and other fastening means are easily formed in the molding process.

PHYSICAL PROPERTIES OF VARIOUS COLD-MOLDED PLASTICS

(NOTE: The data given are as furnished by various manufacturers. As they apply to several makes and types of material, each of which has somewhat different qualities, the range of values is quite wide. Some cold-molded products may have certain properties, even outside the range indicated.)

Type of Material	*Non-refractory*	*Refractory*
Tensile strength, lb./sq. in.	800 to 2,000	500 to 600
Compressive strength, lb./sq. in.	7,000 to 20,000	6,000 to 16,500
Transverse strength, lb. per sq. in.	5,000 to 7,800	3,700 to 6,000
Impact strength, Charpy, ft. lb. (unnotched specimen)	0.4	0.6
Rockwell hardness, 1/8-in. ball 100 kg. load, B	15 to 18	...
Max. continuous temperature allowable, deg. F.	350–750	1,000 to 1,500†
Arc resistance	Good	High
Dielectric strength, volts per mil.	60–130	40
Moisture absorption, % in 24-hour immersion	1 to 3	Up to 15†
Specific gravity	1.8 to 2.0	2.1 to 2.5

† When not impregnated

Refractory cold-molded materials are employed in making such parts as shields, rheostat-bases and heating devices in which the hot resistance wire comes in direct contact with the molded part, switch bases or switch boards (especially where arc resistance is required), separators and barriers in circuit breakers and the like, and in many other applications in which heat resistance is desired. Some of the shapes made are quite complicated and it is possible to mold metal inserts in place, as well as to form holes, recesses and projections.

Clearly, then, the cold-molded plastics fulfill many useful and important functions. Without them the electrical and some other industries would be seriously handicapped, especially as they fulfill some functions that are not met by other plastics and do so at moderate cost.

Negotiations have recently been completed between the Polytechnic Institute of Brooklyn and the United States Shellac Importers' Association for an enlargement of the cooperative research work on shellac which has been carried out by the Polytechnic Institute during the last six and one-half years.

The project is part of an international research program which is sponsored by the Shellac Importers' Association and the Government of India through its Lac Cess Committee. This committee maintains the Indian Lac Research Institute and the London (England) Shellac Research Bureau. The results of the investigations carried out at these centers of research will be exchanged to avoid duplication of effort.

Plans at the Polytechnic Institute include an enlargement of the permanent staff which will consist of a research supervisor, an associate, assistant and two research fellows. In addition, the agreements provide for the deputation of Indian scientists to the staff of the Institute. Men trained in English universities will probably be chosen for these appointments.

Two fellowships of $800 per year, with remission of tuition fees, will be available to graduate students pursuing doctorate work. These men must have their Master's degrees and devote at least half of their time to research on shellac. This research can be used for theses. One of the fellows will be a Chemist or Chemical Engineer, while the second will be an Electrical Engineer. A new laboratory at the Polytechnic Institute is being constructed to accommodate the expanded work which will be under the supervision of Professor Wm. Howlett Gardner.

CAST PHENOLICS AID THE VOGUE FOR COLORFUL COSTUME JEWELRY

(*Continued from page 15*) highly polished. Although combinations of cast phenolic materials with wood, with wood and metal, and with wood, metal and crystal are not new, they can be found in several lines being sold by the better manufacturers for retail jewelry promotion this spring.

One entirely new line, called "bois glace," manufactured by D. Lisner and Company, brings into the picture a new manufacturing process. Where other wood-and-cast phenolic combinations are achieved by cutting the required pieces of cast phenolic out of sheets of the material and then fastening them to the wood with metal rivets or with glue, this combination is achieved by pouring the molten phenolic solution over the wood, which has previously been placed in the mold. The transparent phenolic, when cold, is then polished. The resulting jewelry has the brilliance of crystal, and the transparent coating of cast phenolic acts like a magnifying glass, bringing out the grain of the wood. Care must be taken, of course, to use only wood that is stained very little, if at all, since the chemical effect of the cast phenolic on the wood stain is sometimes injurious to the finish of the piece.

Other combinations with wood or with wood and metal have been made successful by manufacturers serving Lord & Taylor, McCreery, Altman, Arnold Constable and Macy's. These wood and metal combinations are comparatively simpler to make and can, therefore, be sold at a slightly lower price than the "bois glacé," for instance.

Clever designers conceive novelty jewelry in leading fashion colors. These pieces, seemingly intricate, are actually simple in construction. Cut out of flat sheets or sliced off long rods or cylinders of cast phenolic material, they are cleverly assembled and glued or riveted together as the occasion demands

Cohn & Rosenberger manufacture small clips and pins in the shape of bulldog heads, and scotties, singly or in pairs. These pieces offer a striking effect by the contrasting solid color phenol-casting with dark grain wood. A green Bulldog has a heavy lower jaw of wood. A blue Scottie has a narrow collar back and a tail of wood. Turning the materials around, a wood scottie has saddle of blue, black, green or red and twin scotties each no longer than an inch or an inch and a half are sold in all wood or of phenolic material. Sometimes a small wooden scottie pin is sold with a matching cast-phenolic scottie pin attached to it by a chain. The use of wood and cast-phenolics for these amusing small figures, follows the use of all-phenolics when they were first introduced. The earlier pins of this novelty type called "kennel" jewelry by this manufacturer, were in the shape of swordfish, porgies, bass and several kinds of dogs. Any of these small pins are available in a considerable color range, jade green, navy, olive green, turtoise, black, white, red and blue. Selling at fifty cents retail, they come into the lower priced volume classification.

A more sophisticated use of wood and cast phenolics is shown by Leo Glass, manufacturer of costume jewelry, for such New York outlets as Saks-Fifth Avenue, Bonwit Teller and some of the other higher priced houses. Since the clientele of these houses is younger, more "highly styled" less conservative than the clientele of other Fifth Avenue houses, the types of jewelry most popular with them are the handsome larger pieces in more sophisticated color and material combinations.

Merchandising sets of novelty jewelry is 1935's leading sales idea. A purchaser usually selects three to five pieces of the twelve to fifteen matching clips, pins, bracelets, earrings and rings in a set

What is the significance of these new uses of phenolic castings to the manufacturer of novelty jewelry? We would say that the innovations now being presented, the molding of pieces in unusual shapes with perforations for metal joining pieces, or with surfaces to which wood or other materials can be glued or attached, indicates a very wide field for experimentation with great possibilities for profit. It is common knowledge, of course, that profit in novelty jewelry comes from the novelty of the jewelry. The intrinsic value of the materials plays a comparatively small part in the price. So any manufacturer alert to design suggestions from buyers of department stores and from jobbers in close contact with those buyers has a great many possibilities ahead of him for making profit throughout the year, varying his presentation with the seasons.

The ingenious ways in which a designer can manipulate phenolic rods, sheets and tubes has opened a wide

range for inexpensive yet handsome jewelry. For instance, the small circular sections sliced from a long rod and halved, are used with some triangular and some circular pieces in flexible bracelets, like the ones shown in the illustration. A ball-shaped piece is halved and becomes a clever buckle or pin with the round side up and the flat side toward the dress or coat. A square rod is cut diagonally in half and the resulting triangular pieces become parts of necklaces or bracelets. Other geometric shapes are used, still economically, in combinations with wood, metal, ivory, or other materials.

What does this trend in jewelry mean to the retailer?

In our opinion, it would seem to mean two things: First, that cast phenolics being so widely adaptable in color and line to fashion trends is an indispensable part of a jewelry line. They are adaptable to any one of a thousand shapes, for almost all items of jewelry from necklaces to clips. They are proving increasingly valuable as a focus for advertising and sales promotion The "Regatta" set of Cohn & Rosenberger, for instance, has been recently featured by Macy's as an advertising lead. The "Harlequin" set and the "Bois Glacé" of Lisner are, at this writing, slated for promotions. The "Bud" set and the tortoise-shell combination available in groups are Altman features. The similated rose quartz set for summer wear with pastels is also slated as a promotion feature. Hence, although they may comprise only a portion of the stock of a store's jewelry department their availability in so many sets, and their adaptability to promotions, make them more significant than any other material available only in miscellaneous pieces.

Two things are keeping cast phenolics in the lead. The first is the unusually clever promotion given to the substance in advertising and publicity by the manufacturers of basic material and by the manufacturers who molded it into jewelry. The second is the low cost of the product itself in all its infinite varieties.

LAMINATED PLASTICS IN THE PETROLEUM INDUSTRY

*by H. L. Friedrich**

TO FIND materials that will resist the severe operating conditions encountered in the production refining, and distribution of petroleum and petroleum products is no small problem. Corrosive gases and vapors, acids, alkalis, solvents, grit, dirt, high temperatures, high pressures, in fact nearly every conceivable destructive agent is present to a certain extent. In some locations, therefore, it is extremely difficult to get materials that will stand up.

For many such difficult conditions, it has been found

* Industrial Division, Westinghouse Electric and Manufacturing Company.

that Micarta (a laminated phenolic material) is the solution, because it resists the corrosive action of a large number of the fluids and gases handled; is insolvent; has good mechanical strength; resists fairly high temperatures; is low in cost; and is easily machined or molded into the desired shapes.

The most common form in which plastics are used is in laminated fabric sheets 36 inches square and ranging in thicknesses of from one-thirty-second to as high as twelve inches. These sheets can be cut and machined into pump valves, discs, washers, gears, pinions, compressor rings and piston rings. For other uses, laminations with paper, wood or asbestos base is available. They can be graphitized for use in making bearings and other parts subjected to friction. In addition to sheet form, these are available in rods, tubing, angles, channels and special molds.

Laminated plastics were first introduced to the Petroleum Industry some ten years ago for making valves and discs on reciprocating pumps. These pumps, usually operating under extreme service conditions and high pressures, presented a serious problem in that it was difficult to obtain valve material that would stand up, and frequent replacements meant high maintenance costs.

Valves made from laminated plastics were tried and proved to be highly satisfactory. The material resists oil, gasoline, kerosene, naphtha, benzol, salt water and weak acid or alkali solutions. It is not affected by age nor by temperatures as high as 220 degrees Fahrenheit. It does not chip, crack, break, pit, corrode or flake. Laminated plastic valves always seat properly because they do not swell or warp out of shape. They are quite in operation, light in weight and do not batter the seat. When worn they can be re-faced. The experience of many oil companies has shown that they outlast metal or rubber many times.

In more recent years, piston and compressor rings have been made of a special type of lamination and have proved to be highly successful. The piston ring shown in Figure 1 is for a plunger pump. A special treatment employed gives it the proper tension and keeps it in the form of a true circle. Tests made in several refineries showed a very high efficiency and long life, outlasting cast iron rings. It was further shown that they require little or no lubrication and do not score the liners.

FIG. 1

Figure 2 shows another form of segmental ring known as the "stop-ring" type. These rings are very successful on compressors handling "wet" or "sour"

gases where lubrication is a problem. They eliminate the use of castor oil, mineral oil and other expensive lubricants. Ordinary lubricating oil, and very little of that, is all that is needed to lubricate the compressor cylinders. They will not score the cylinder liners. A number of these rings have been in service in refineries for more than a year and they are giving better service than metal rings.

FIG. 2

Laminated gears and pinions have served oil companies for a number of years. They are especially suited for gathering pumps and gear driven pumps of all types. Silent and efficient, they have longer life than cast iron, rawhide, or steel. Other products that have been used with success by the Oil Industry are "rod-savers" for reciprocating pumps, and pressure and vacuum discs for oil storage tanks. Rod-savers consist of a linen base laminated tube cemented onto the piston rod with a special cement and are easily installed on new and old equipment. Not only do they protect new rods but they also serve to re-condition worn and scored rods. Pressure and vacuum discs for oil storage tanks can be cut from plate or molded. Mechanical strength, light weight and resistance to corrosion and warping make plastics here desirable.

There are grades of the material which have high dielectric strength and are used for insulating purposes, such as bus supports, bushings, shields, terminal blocks, switch bases and panels. Beside being a good electrical insulator, it resists the action of a corrosive atmosphere which is present even in the most carefully protected localities of refineries, oil fields and pipe line stations. Insulating laminations have also been used quite extensively in geophysical work. Tubing, rods and plate are ideal for winding coils, making precision instruments, and for building up instrument panels and carrying cases of various types.

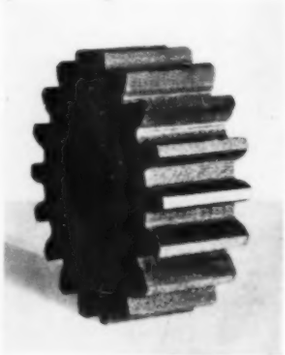


FIG. 3

TRANSFER MOLDING BROADENS FIELD

(*Continued from page 19*) Finishing is reduced to a minimum.

It is impossible to mold parts of the Schick Dry Shaver by any other method than transfer because delicate cams and shafts necessary to its accurate operation must be molded with precision. Conventional methods of molding would collapse these inserts or throw them out of alignment and render them useless. The Schick bearing (illustrated) has a hardened steel tube inside which invariably cracked under the old method, yet is perfectly centered and remains undamaged in transfer molding.

The non-magnetic coil case, used by telephone companies and illustrated in the November issue of MODERN PLASTICS, is cast by transfer molding. It is shown here again with gates still attached to illustrate the tiny surface remaining to be finished once these gates are removed. Commutators for a toy train must maintain an accurate dimension of .0005 in. between two brass cups. This precision is maintained by transfer molding.

Pencil tubes with spiral threads for metal arbors come from the molds without finns

Glass and metal molded into plastic handles become permanently inseparable

The Western Union turret panel (illustrated) has fifty accurately machined inserts of phosphor bronze costing six cents each. They must be set into the finished casting with no greater variance than .001 in. in height. If one of these bronze inserts is collapsed in molding there is an immediate loss of three dollars in material alone. None of them can be salvaged. This made casting by the old method costly, indeed, because they were frequently collapsed. Transfer molding has reduced this waste to almost nothing. The inserts are placed in the mold by hand and covered by protecting sleeves which allow a free flow of the plastic material without any danger of collapse.

The smallest coil form ever molded (illustrated) is made possible by the transfer method and its paper-thin separators and small holes are unhampered by finns when removed from the mold.

Tiny files and screw drivers come from the transfer molds with perfectly insulated handles cast as an integral part. There is no cement to work loose and allow the handles to slip off or turn. Hollow handles for use with hardware may be metal lined or cast from impact resisting materials, and because of their homogeneous construction their finish will last forever. Two color castings of unit construction are made possible without cementing. Panels of one color may be cast into boxes of another color. Window signs may have a background of one color and letters of another. Inlays or any composite arrangement of colored plastics are made available without danger of intermixing or separating. It is even possible to place a mirror in a mold and cast a frame around it without damage to the glass or its silver back.

There seems to be but one thing which transfer molding is apt to collapse, and that is the old slogan: it can't be done!

BLAZING NEW TRAILS

(*Continued from page 16*) as soft pastel colorings will permit. It is translucent and, lighted from within, will distribute as much or as little light as required depending upon the number and wattage of the lighting bulbs used.

These columns would surround the steel building supports and he estimates that as much as 75% or 80% of the cost of stonework might be saved through their use and a more pleasing lighting effect obtained with further savings by eliminating other overhead lighting fixtures.

They can be made three or four feet in diameter, fluted, ribbed, checked, striped or plain. In fact, their manner of decoration would be limited only by the imagination. White, or bright colors, could be easily cleaned and would never require refinishing or repainting.

Further use of these lighting columns suggests itself in restaurants and small shops where a double lighting circuit, through a simple turn of a switch, could produce either daylight or moonlight effects as occasion required.

It is not beyond imagination to picture the department store of the future lighted exclusively through the use of such translucent columns, supplemented by overhead panels of plastic material illuminated by concealed bulbs. Overhead hanging fixtures in current use gather dust, and dust is the greatest natural enemy of delicate fabrics and merchandise displayed in stores.

Mr. Wocel has created a clever one-piece two-color plastic directional sign to fit into this picture of the future. There is no doubt of its success. Its permanent finish is more lasting than glass. It has no metal

to corrode. No enamel to chip. It is combined of opaque and translucent compounds and illuminates by reflection or translucence of natural or artificial light. An invisible Neon tube could be used around its edge with startling effect. Since these signs can be made any size, their future is without limit. Door panels for office buildings can be molded with business and executive names an integral part of the panel and illuminated for easy reading by the natural office light, or light reflected from the corridors. Unfortunately, these signs were developed too late for Radio City, otherwise they might have been used there.

There is a new era afoot in America. It is evidenced by the strides made during recent months by industrial design and the resulting sales peaks experienced by many who have taken intelligent advantage of this gigantic lever. We may expect anything. But in order to obtain a definite objective, plans must be made, pioneering must be done, new ideas and new materials tried and tested, and those with courage to finance such undertakings must also have vision and imagination to see them through, according to Mr. Wocel.

He is a graduate engineer from Columbia, and says he was sort of shoved into molding plastics when he came with the Apex Corporation to develop accounting machines. He soon became interested in thermo-setting materials in connection with the work, and the first thing he knew he was fabricating everything from cigarette holders to walking sticks with automatic lighters in their handles.

Nearly everything imaginable is made in the plant. Poker chips and racks, cigarette lighters, holders, ash trays and cigar and cigarette humidors.

Cosmetic containers, valves and gasoline gages for aircraft tanks.

Much of the work is in the field of cast phenolics. That is: fabricating products from plastic material which is already shaped, as differentiated from molding these shapes from compounds under heat and pressure.

One of the most important items produced by the company is a mercury thermometer about twelve inches long. It consists of a hollow tube of especially strong and translucent plastic in which are drilled 40 holes, each sixteen-thousandths of an inch in diameter, in spiral formation and all entering the main bore. These holes must be definitely located within one one-thousandths of an inch of specifications, and metal inserts form electrical contacts with the mercury as it rises, and breaks them as it falls.

Bottles, of all sizes from fifty cc. up, are fabricated from phenolics in which chemical laboratories store hydrochloric acid. These bottles are made from hollow tubes threaded at both ends. The bottom and top of the bottle are also threaded and when screwed into the cylinder of the bottle are cemented and baked. The result is a safe container for the acid, with visibility obtainable with no other material.

The Apex Specialty Corporation, among other things, turned out the wall panels for Mr. Loft's yacht, the tiles for Mr. Percy Rockefeller's bath, and a specially

designed clock in the office of the president of the Ex-Lax Corporation.

"One of the nicest things about plastics," says Mr. Wocel, "is that many beautiful effects can be obtained by combining Bakelite, Catalin or Marblette with molded ureas, phenolics, cellulose acetates, hard rubber, pyroxylin, wood and metal; using one material as a base and another for decorative effects. They all may be combined beautifully and the field is so vast, and the application so simple, one could talk on it forever."

Custom plastic-fabrication brings many problems for Mr. Wocel to solve. His inventive mind, coupled with a pioneering spirit and native ambition bring him many headaches, but he meets all comers (even reporters) with a good-natured grin.

MONOPOLIZING COLOR IN PLASTICS

(*Concluded from page 30*) set-up, we find that there are two weapons of the second species, each of which may be employed by a color vigilantee without reference to the other. The common law against unfair competition is perhaps the most widely available recourse against color invasion. Suit may be brought anywhere—in a Federal or State Court—and not only is it practicable to secure an injunction against continued trespass upon color but it is possible to obtain also an award of money damages for injuries sustained. All that is necessary is that a prior user of a color shall muster evidence to convince the Court that the rival who has followed in his color shadow has done so with intent to palm off the imitative colored commodity or container as the original, or "the genuine."

There are two possible objections or disadvantages to the above-mentioned recipe for "going to law" in behalf of color. The first impediment is that this is necessarily an after-the-fact formula. A good many users of coloring in plastics have indicated by their correspondence with Washington, and otherwise, that what they especially covet is a means of fending off color counterfeiting—some instrumentality that will stop color sabotage before it starts, either by putting the fear of God into the color-snatcher, or otherwise. Frankly, there is no ounce-of-prevention in a suit at common law, unless it be that it serves as an object lesson to deter other potential color culprits. As to direct action, however, the color owner must needs wait until some harm is done before he can obtain a padlock from a Court. And it may be one thing to obtain an award of damages and another matter to collect.

A second sobering entail of the common law formula for color fortification is that it usually involves quite a bit of expense. For lawyer's fee, court costs, the assemblage of evidence, etc. As to this last, the claimant of superior rights in color must muster proof not only that he was first to fasten on his particular pet color but

that the trade or the consuming public has come to consciously, or subconsciously, associate the distinguishing color with his house or his product. That done, testimony must likewise be forthcoming that the color-trailer has attempted his echo of color with malice aforethought. And that the laymen who are guided by color have been confused or deceived in consequence of the overlay. All of which substance to support suspicion costs money, and effort, and time.

It is because of the expense involved in an adventure in the common law, that a number of color-capitalizers have turned to the alternative, viz., the seeking of first aid from the Federal Trade Commission. Under the Federal Trade Commission Act and the Clayton Act, the Federal Trade Commission is empowered to take steps on its own initiative to call a halt upon any offending practices in trade. A color owner who suffers from color forgeries may have quietly tipped off the Trade policeman, but he does not appear, nor need his name be mentioned, in the proceedings against the accused. The Trade Commission serves a complaint on its own responsibility and if, after hearings, the charges of unfair trading are sustained, the Commission serves a Cease-and-Desist Order which demands instant discontinuance of the color disguises or other unlawful practices. Not the least of the advantages of letting the Trade Commission do it is that Uncle Sam foots the bill. This, indeed, is the only means of enforcing respect for color-privilege that does not require a personal or corporate defense fund.

Color-defense partnership (silent partnership) with the Trade Commission is, nevertheless, not all joy. To induce the Trade Commission to intervene at all, it is necessary for an aggrieved party to show that action in behalf of color isolation would be in the public interest. The Trade body is not supposed to act as an umpire or a peace officer to settle selfish business disputes between rivals. It is supposed to put in its oar only if and when it is demonstrated that, say, color demoralization, is imposing upon the general public. A second disadvantage is that an application for disciplinary action by the Trade Commission may have a tedious wait for attention. The Trade Commission always has more jobs on hand than its staff can turn over promptly. Yet no victim of color larceny can comfortably cool his heels while the grab continues.

Going back to the main stem of color protection, as it affects plastics, we find that the second major branch is wide of the common law and Federal regulatory power. There is, in this twin arm, a certain very definite dependence upon Governmental support but it is wholly in terms of authentication. This subtle difference is not fully understood by some owners of industrial property. Not having time to thread all the legal mazes they have come to present color responsibilities with the belief that mere entry of a claim on Uncle Sam's books begets aggressive cooperation by the authorities at Washington.

This assumption of militancy by Federal agencies of enrollment is wide of the mark. It has little foundation

CLASSIFIED

Executive position open. Must be capable of supervising help and have a complete understanding of plastic molding equipment and the making of molds, also a thorough understanding of plastics of all types, their characteristics, etc. What is particularly desired is a chemical engineer with a mechanical background. When answering this ad, applicants should state the practical experience they have had together with references.

Reply Box 106, Modern Plastics

POSITION WANTED: Manufacturer of celluloid articles—full knowledge of forming-blowing, molding and swedging. Superintendent six years. Some experience of plastics. Reply Box 101, Modern Plastics

WANTED: Man to take charge and develop molding plant. Must have thorough knowledge of various kinds of molding materials, design of molds, training of operators, and be able to establish efficient manufacturing methods. Give complete record of experience in answering.

Reply Box 107, Modern Plastics

Control color effects, designs, etc., on buttons, novelties, etc., on plastic material when molding same. Pat. No. 1,979,084. Write D. Sweeney, Sea View, Staten Island, New York.

in fact no matter whether the process of credentialing take the form of the patenting of a design in colors, the registration of a colorful trade mark, or the copyrighting of a "label." In each of these pedigreeing stunts, and in all of them, the function of the Government might be compared to that of a realty title company, without the insurance feature that sometimes attaches. That is to say, Uncle Sam searches his records for prior claims. And makes more or less investigation (depending upon the system) to make sure that an applicant is first in line for his particular version of the color expression. But, by and large, all that the Patent Office does in any of its several clearing operations is to certify and attest, as to date of entry, an applicant's claims to prior rights.

Let us hasten to acknowledge that, even so, the support of the Government is not to be scorned. Registration of a trade mark, or grant of a patent on design, operates to automatically challenge any person who appears later with application for the enrollment of the same or very similar subject matter. But it does not follow that Uncle Sam assumes any obligations for prosecuting patent or trade mark infringements. That is wholly the job of the owner of industrial property. The latter obtains from Washington a certificate that, unless upset by evidence, will be accepted in any court as presumptive evidence of prior or superior property rights. But the best that such documents can do is to summon Uncle Sam as a character witness. In the last analysis it is up to the color explorer to make out a case of imitation or infringement.

For all that Uncle Sam is in this attitude of detachment following certification of color conceits, it happens that the U. S. Patent Office does exert a deep and lasting influence upon the protectable status of color assets. Because of the strictures imposed, incident to certification, upon color monopoly. Particularly is this true in respect to trade mark registration, perhaps the most effective, as it is certainly the most popular of all the forms of industrial property protection. One of the cardinal principles of trade mark registration is that monopolies are allowable only in specific translations or expressions of color. Never in color in the mass. Under the Rules and Regulations governing the administration of the basic Act of 1905 "mere color" will, under no circumstances, be accepted as a registrable mark.

This denial of broad monopolies in enveloping color has persisted for years on end. It started more than half a century ago when trade mark registration was denied to a red bag. Later, official thumbs were turned down on a blue closure or stopper for a glass bottle. Yet more recently the taboo on blanket monopolies of color, via trade mark franchise, has operated against plastics' producers who have sought to bolster, via registration as trade marks, their claims to sole ownership of the background or foundation colors of molded containers, caps, closures, etc. Forbidding, though, as the general outlook must appear, there is a way to establish at least partial monopolies in color if one knows the secret of color admission to trade mark shelter

Failure or success in securing the coveted trade mark registration for an allowable monopoly in color hinges on an understanding of one controlling tradition. This tradition insists that a trade mark shall be a fanciful or arbitrary design or device applied to or accompanying an article of commerce but shall not be the article itself nor any structural part of the article. Under this ultimatum, the blue surface or the red coating of a plastics receptacle cannot gain entry as a trade mark for the vessel or its contents. By the same dictum there is equally slim chance of clamping a partial monopoly of color by registering the hue of a plastics container cover, the base of a plastics display stand or any other detail that ranks as a structural or functional feature.

Splitting hairs on the construction of this ban on piece-meal coloring is, at that, the magic loophole for the plastics colorist. Mass color applied to a fundamental, component part of a plastics structure will have little chance of qualifying as a technical trade mark. But color expressed little chance of qualifying as a technical trade mark. But color expressed in the form of a band, rim, panel or other non-functional element in a plastics mold has every chance to win a trade mark diploma. Even more sure of success are the conventional expressions of color—representations of stars, diamonds, circles, crescents executed in color on a plastics background. In short, the silhouette in color, superimposed on plastics, represents the essence of the monopoly obtainable by the trade mark channel.

One of the most important and most interesting potentialities of color monopoly in plastics is just rising above the horizon. Irked by the limitations of Governmental facilities for the recognition and protection of industrial property, progressive opinion in business is, gradually, swinging to the conviction that the doctrine of self-government in business must embrace mutual insurance of "dress" and design of goods. The concrete expression of this new ideal is seen in the intra-industrial or inter-industrial registration bureaus which are, even now, functioning at full stride in lines such as textiles, jewelry, toys, etc. Several of these group clearing houses were in successful operation before the NRA appeared on the scene. The movement has, however, gained greatly in momentum thanks to the machinery provided by the Code Authorities in various industries. Primarily, most of the cooperative registration bureaus thus far established are concerned with the allotment-by-agreement of priority rights in "designs," as such. Color is reckoned with only as an element in design. There is stirring, however, an incipient agitation which seeks to have the integrated industrial registration bureau likewise undertake the allocation of distinctive colors and "coined" color names. Naked color, if appraised by expert opinion as unique, would be confirmed as the property of the discoverer. Needless to say, any system for reciprocal recognition of claims to color could prevail only if there be 100 per cent compliance within the industry.

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